THE FOUNDRY

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Improved Brass Furnaces.

By D. C. THOMPSON.

In these days when the air is full of foundry literature and so much is being written on the melting of iron and the different ways of constructing cupolas, it seems to me there ought to be something said on the construction of the brass furnace. By request, I will try and give a description of two or twin furnaces we put in over a year ago, and which give us good satisfaction. Fig. 1 is a photographic view of furnace in operation, the flues being connected with the chimney of our large core oven. They are what might be called the cylinder type of furnace, and are made to be hoisted out and in, as will be seen later.

The common custom of having grating on the floor in front of furnace for the purpose of giving draught is done away with and instead we put in solid plates. Our reason for doing so was to try and stop so much metal from falling down the pit. As all know who have worked a furnace, in lifting out the crucibles it often happens there is some metal spilled, or a cracked crucible may empty a hundred pounds or more in the same place, and in all such cases there is a good deal of metal going down the pit, though we are not so sure of getting it all out again. With the construction here illustrated we have it in sight on top of the plates, which are made to roll up on a hinge (see photographic view Fig. 2), holding themselves in place when rolled up. Now, I

FIG. 1.

imagine I hear some one say, "Where do you get the draught from?" It will be seen by cuts that the top of furnace is raised ten inches above the floor and is filled in all around with riser B, which is cast with openings, and admits all the draught necessary when using natural draught. But our blast is on all day for the use of the forge shop and foundry, so we had it connected to the wind chamber of the furnace (see Figs. 2, 3, 4 and 5), and we find the blast very convenient, for after the fire is started in the morning we have perfect control over the draught and we don't have to worry over damp, rainy days nor are we affected by the way the wind blows. We can also have a good natural draught by leaving wind chamber door (T, Figs. 3 and 4) open.

Fig. 3 shows plan of furnace and ash pit, the top of furnace being made in three sections. The main or stationary section (A) is bolted to risers (B) (see Figs. 4 and 5) with countersunk headed bolts (R); one of the loose sections (C) is left off to show furnace (D), and it will be observed that there are three screw-holes (E) in top flange to insert three lifting screws for the purpose of hoisting furnace out when they have to be relined (see details). When lowering furnace in place the three guiding lugs (F) on top of grate plate (G) (Figs. 4 and 5) brings the furnace to place. In loose section (C) there are eight slots (H) on the inside to provide for expansion, and also on section C is cast pin I and roller socket J.

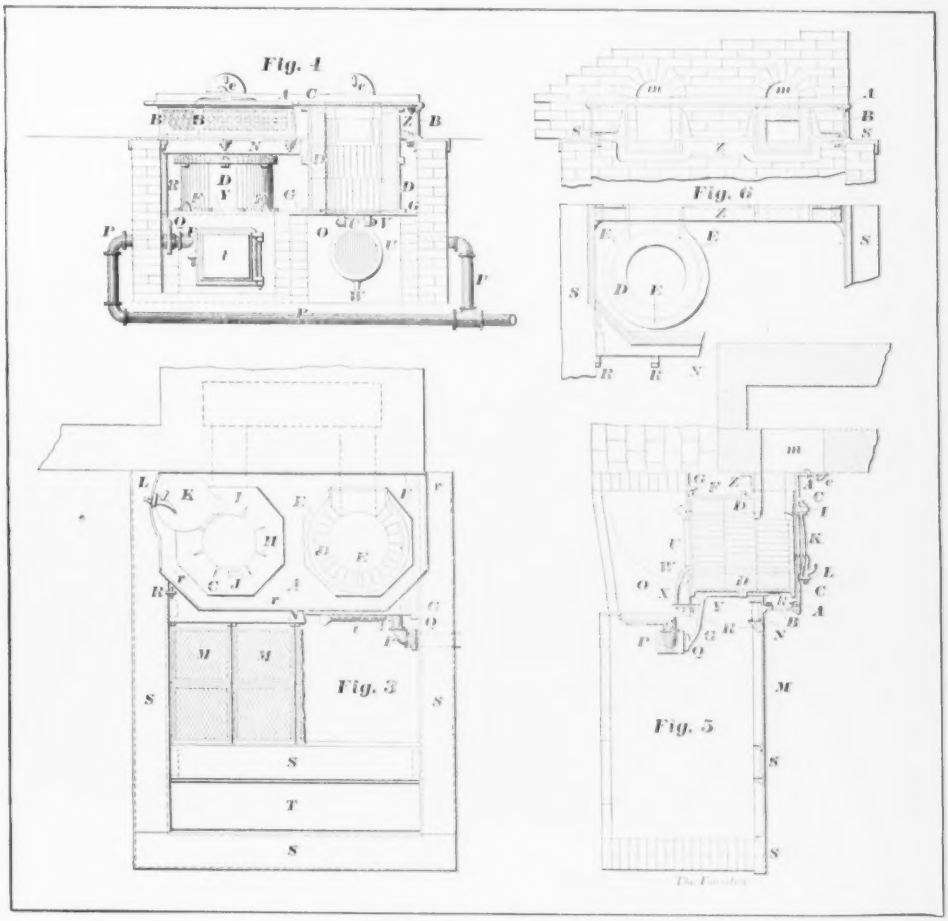
We will now look at furnace cover (K). It is not of the sliding or lifting kind. It is what might be called the quarter turn cover as it turns a little over one-quarter to uncover furnace. It turns on pin (I) and rolls on roller (L), and when roller is started out of roller socket (J) it moves very easily as the cover is lifted clear of furnace top (A), and when roller is in socket (J) cover is tight.

It will be noticed that part of ash pit plates (M), also part of cross rail (N) is cut away to show front of what we call wind chamber (O) (see Figs. 4 and 5), which also shows blast pipe (P) regulated by valve (Q)

FIG. 2.

and valve lever (R) (see Figs. 4 and 5). Space T of ash pit cover we have filled in with wood flooring. Making ash pits in this way gives lots of room for ashes, and we don't loose much floor space.

Fig. 4 shows front elevation of one furnace complete, and front sectional view of the other. It will be observed that we use the drop grate (U), which is made to plates (M), hook on to and lift bolt (Y) and grate drops, and we have a clear sweep to knock off any clinkers that may stick to the sides of furnace without coming in contact with grate. When ready to put the grate back in its place we put the hook down through the furnace and by lifting it up it will catch itself, all of which can be done without going down the pit.



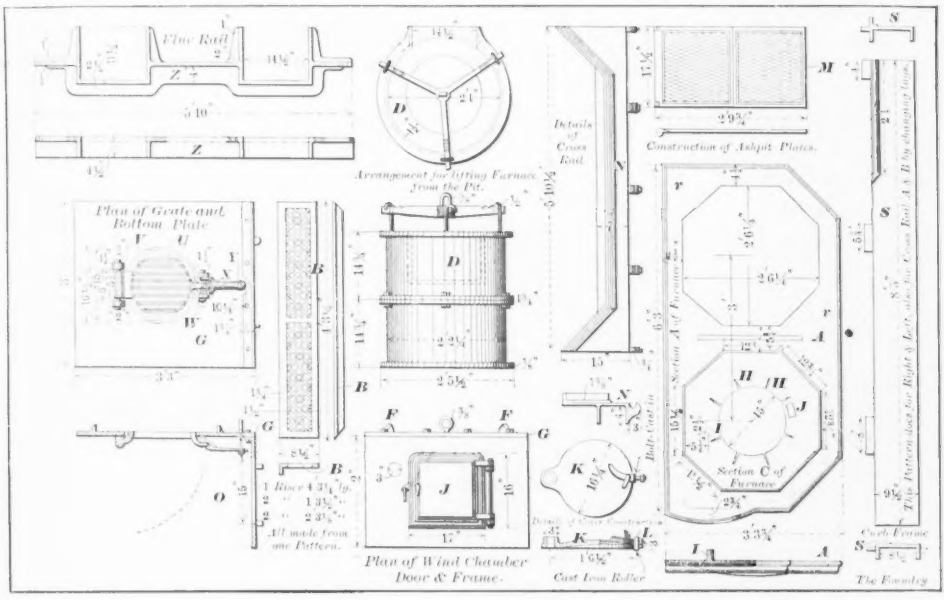
IMPROVED BRASS FURNACES.

be taken out and in without disturbing hinge bolt (V) (see Figs. 4 and 5). As will be seen, there is an opening in grate hinge to fit over hinge bolt (V). Now, there might be some one saying, "I doubt that grate staying in its place." But I can say we have no trouble in that way. Grate (U) has a horn (W) on the front or lower side which catches on to what we call grate trigger (X) (see Fig. 5), and is worked by trigger bolt (Y) (Figs. 4 and 5). When grate has to be dropped we lift one of

Fig. 5 shows side sectional view of furnaces and ash pit, also gives a better view of grate and trigger and how it is dropped. Fig. 6 shows what we call the flue rail (Z), which is made to connect the furnaces to flue in core oven wall. It is full width of furnaces and is bolted to curb frame (88). This view also shows flue hole through core oven wall extending above the top of the furnace for the purpose of giving us a way of cleaning out the bottom of chimney

flue, the cap (C) (see Figs. 4 and 5) serving as a good check damper. In lining up these furnaces (see Figs. 4 and 5) the depth of lining is 2 feet, 5 inches, and by putting in three tiers of brick of 9 inches each makes 2 feet, 3 inches. The balance of lining is made up of pieces of old crucibles and fire clay. Our reason for doing this is that the brick has to expand in some way and there is only one direction in this case for them to do so, by pushing up section C, which makes this uneven on top for roller (L) to run on. But when necessary it is an easy matter to take section C and reset it by removing pieces of crucibles and fire clay without disturbing the brick. In putting cylinder (D) we used a 26-inch pulley pattern by having some pieces of flanges sawed out. So also pit curbs (SSS) and cross rail (S), which were all made from one pattern by changing lugs and strips. Riser B was made from a stair-riser pattern and the different lengths required were all made from one pattern. The diamond plate (M) was made from a floor-plate pattern by adding a hinge to it. Of course there was some cutting and filling going on in making the molds, and I mention this to show there are many things that we might make use of if we would look for them and at the same time save a good deal of pattern work.

In making these furnaces I did not intend


Fire Rail
Plan of Grate and Bottom Plate
Arrangement for lifting Furnace from the Pit.
Details of Cross Rail
Construction of Ashpit Plates.
Section A of Furnace
Section C of Furnace
All made from one Pattern.
Plan of Wind Chamber Door & Frame.
Cast Iron Roller
Curb Frame
The Foundry

IMPROVED BRASS FURNACES.

the brick in the furnaces we put them in dry and tight together, and when we get one course in we make the clay into clay-wash thin enough to be poured in behind the brick and feed it up in this manner until all is filled and settled. We find this way of lining does just as well as setting each brick separate, and can be done in a great deal less time. There is no doubt but that some one is thinking by this time that I must have a national bank or perhaps the U. S. government behind me to get up so many patterns. It was not necessary in our case, for we have quite a stock of patterns to select from, and I merely chose such patterns as suited our purpose. For furnace that I would materially change the construction of the brass furnace, as I only put into use a few of the many kinks I have read of in THE FOUNDRY. We all know most every shop in the country has its own particular kind of furnace and of course they are the best. We often hear of their great melting qualities, and of course ours is one of the last kind. To show what we have done in the way of melting, I will say that we work but eight hours per day, and our fires are never started till after eight o'clock in the morning, and when necessary we take out four heats in a No. 40 crucible, and they are full at that. We are all through by 5 o'clock in the evening. As a rule our metal

has to be very hot. Now, this plan of furnace does not have to be confined to two, four or six, but can be extended as far as wanted so long as there is chimney capacity to suit. It can be done with very little change in patterns, and as will be seen with very little brick work. In plants of four, six or more furnaces there should be an extra furnace shell, which should be lined and ready to be put in place, and, when necessary, if one burns out it can be hoisted up and the other lowered in place without losing a heat.

IMPROVED BRASS FURNACES.

The drawings show in detail the several parts of the furnaces, also their dimensions and will explain many points involved in the construction of these furnaces better than all the description which could be furnished.

Best in the Market.

Your book is the best in the market for a foundryman.

WESTERN MALL. & GREY IRON MFG. CO.

Port Washington, Wis.

Some Observations of an American Iron Man Abroad.

Munich, Germany, Jan. 3, 1898.

To the Editor of THE FOUNDRY:

I wish it were in my power to comply with your request to present to the foundrymen of America, through the medium of your well-conducted monthly, a description of some of the most progressive European foundries. There are two sufficient reasons why I cannot. First, I have not the technical knowledge to go into the details in the manner that an intelligent foundryman would require, if he were to be really instructed. Second, the foundrymen of the continent, while courteous in the extreme in their offices, only in a few instances invite an inspection of their works. I visited the principal shops in Germany, Switzerland, Holland, Belgium and Italy, and met, in Vienna, the directing powers of the largest iron and steel works in Austro-Hungary. It will perhaps surprise American readers to learn that little Switzerland leads the industrial procession in enterprise and progressiveness. Unquestionably the greatest foun-

dry in Europe, if not in the world, is Sulzer's, at Winterthur, near Zurich. This has already been described and illustrated, through your enterprise. At Solothurn, another Swiss town, is a works nearly as large. At Orlikon, a suburb of Zurich, is an establishment employing 2,000 hands. My eyes were opened very wide at a number of helmets. I was shown all through this establishment by the aged superintendent, who proudly pointed to a bronze statue that had lately been presented to him in honor of the completion of forty years of service of the company. There were parts of great blowing engines for the huge Krupp furnaces now being built at Duisberg; pumping engines

ARCHER BROWN, OF ROGERS, BROWN & CO.

places, to be told that the average number of employes under pay was respectively 1,000, 1,500, 2,000, 2,500 and—in one case at least—the great Alsatian works at Mulhouse, 5,000. I saw the men come out to dinner at the last named works, and they looked like an army of the Franco-Prussian war, only with blouses and caps instead of blue jackets and for city water works; locomotive castings, and a large quantity of cotton machinery, extremely delicate and beautiful in workmanship. The range of castings was from the very heaviest to the very lightest. And this is a noteworthy feature of continental shops. They do not subdivide and specialize as we do in America. When I tried to per-

suade my venerable Alsatian superintendent that he needed good American pig iron to give strength and finish to his work, he first showed me the pig iron yards, where he had German hematite, Luxemburg soft iron and Middlesboro brands; then took me to the departments where the finest finished work was being set up, and at the end, with an engaging show of candor, turned to me and asked whether, if I had his place, and was getting such results, with such materials, all at low cost, I would think it wise to commence experiments upon foreign materials.

If I were asked what features of continental iron business struck me as noticeably different from our American ways, I would mention several, some of them more curious than important; some of them essential. First, hours of work. A German, Swiss or Italian workman puts in always ten, and very often eleven hours a day of work. Whether our fond boast that an American mechanic will put up as much work in eight or nine hours as his European brother in ten or eleven is just, I will not venture to say. These workmen are sober, industrious, and although wages are low, they get ahead. In Germany and Switzerland especially there are marked signs of prosperity. Long hours, good works and freedom from strikes are enabling their masters to take work from all parts of the world, beating the English in a manner that has at last thoroughly waked up our self-complacent cousins of the "tight little isle." The result is that all classes share in the prosperity that comes from steady and profitable employment of labor. As I can not speak with definite knowledge of the labor organizations and their workings, I shall not venture upon the subject. It is a curious fact, however, that German unions, their own men working ten and eleven hours, subscribe and send funds to the English machinists and molders (called engineers) now on strike for eight hours! The suspicious English are wondering exactly what the motive is.

Of the mechanical conservatism that we hear so much about—the spirit that will not change from hoary traditions of how the grandfathers did it, because Yankees or others have new-fangled notions, I am free to say there is less of it on the continent than I expected. You must go to Great Britain to find that plant in full bloom. The Germans are in the first full harvest of their scientific sowing and planting. The young fellows from the technical schools are in the chief positions at furnaces and mills and foundries, and the old rule of thumb has to give way for a rule with a reason behind it. But in spite of this, there is a surprising lack of knowledge of analyses of iron, among those who run all but the largest foundries.

There are some features of business in these countries which in America we would call frills. Officialism has full sway. There is a great man about each concern who is surrounded with a state we are altogether unfamiliar with. There is the "Herr Directeur," whom all approach with hat in hand. There is the engineer, who has mechanical charge. Under him is a superintendent, and other managers, according to the extent and diversity of the business. Etiquette is insisted upon. You never enter a man's business office without knocking. Indeed, in most cases, entrance is impossible until an attendant is sent to conduct you in. You never enter with your hat on. In passing out, it is essential that he of the highest rank should go first. If you get a hearing at all, it is always courteous and earnest. The type of business snobbery that breaks out in second grade officials in our American concerns is conspicuously wanting. Every man of business standing speaks German and French—a few English. In Holland and Belgium, German, French, Dutch and English usually cut a figure in every business conversation with foreigners.

One noticeable thing is the air of mystery and secrecy with which most foundries surround all their mechanical operations. The impression is given that each one is manufacturing by some secret process which none of the others enjoy. High walls are built about the works and every avenue of approach guarded with great care. When you ask the natural questions as to class of work made, the kind of iron employed, manner of mixing, etc., the answers are as vague as those of the Delphic oracle. One would think that the making of ordinary railroad castings, for instance, was a secret handed down from the fathers and grandfathers. It is but just to say that in the largest and most progressive concerns this somewhat antiquated wall of mystery is taken down, and the intelligent managers talk frankly and are open to suggestions.

But I find I am digressing to the non-essentials, and your space is too valuable

for those. On the main question of whether America is to maintain and strengthen her hold on European markets, I am very hopeful, as to some lines of finished goods—especially machinery. But in raw materials—pig iron, coal, steel billets, etc., the case is not so clear. The Germans and Belgians are going to furnish raw materials for the continent, or know the reason why. Their preparations are broad and deep, and it will take very low cost, low freight rates and high grade stuff from America to permanently hold place against them. Even the English will have to give way. But there are some markets which, with good management we can hold. And, strangely enough, one of the best of these is Lancashire, England, the scene of the present great strike, and the heart and center of the English iron industry. ARCHER BROWN.

Something About Foundry Office Work.

By a Foundry Clerk.

As a general rule, a well conducted foundry has an office rigged up in good style.

The work done in such an office is not all for publication, but whatever can be published may be of interest to the reader. Having for many years done the work in such an office, in which I had started at the very bottom, I have learned to make some sort of statistics, from given results, of which I will try to give an illustration.

Production, pay roll and raw material are great factors in every establishment, and if a monthly report is to be made out, those three items will always form a solid basis. There are other items, such as power and heat, wear and tear, building account and so forth; but I will, for good reason, omit the latter and take the three items as given above.

As a result I may find at the end of the month:

	Pounds.		Tons.	
Production of good castings	400,000	=	200	
Production of bad castings	20,000	=	10	(5 %)
Production of foundry castings	10,800	=	5 800 lbs.	
Paid to molders (includ. officers)				$1,860 00
Paid to coremakers				342 00
Paid to laborers				1,400 00
Hours worked by molders (including officers)			7,750	@ 24c
Hours worked by coremakers			1,800	@ 19c
Hours worked by laborers			10,000	@ 14c

Outlay for raw material, $2,850 = $14.25 for one ton production.

Although all figures given are of my own imagination we may say in this case they represent facts.

I go to work and make the following extractions:

1. Cost per ton compared with molders' wages.

2. Cost per ton compared with coremakers' wages.

3. Cost per ton compared with laborers' wages.

Now I take the 7,750 molders' hours, and say 10 hours will make a floor, I have 775 floors. Continuing, I say:

4. Cost per floor compared with molders' wages.

5. Cost per floor compared with coremakers' wages.

6. Cost per floor compared with laborers' wages.

Again, I take the 200 tons of good production as a basis, and continuing I say:

7. What did one molder hour produce in pounds?

8. What did one coremaker hour produce in pounds?

9. What did one laborer hour produce in pounds?

This will do for illustration, I presume. Can the reader see what a lot of statistical material I have added to my report? No doubt he can. As the months go by new reports will make its appearance, and I should not wonder there is a rise and fall in items. This, however, is most interesting to the manager or foreman: Twelve times in a year he will have a chance to see how his management is working, and this is the most good any report will bring. Although a non-producer, the foundry clerk may serve in his humble way with good results.

How They Account for Fires in Pennsylvania.

An alarm of fire was sounded last night at 11:50 o'clock for a blaze in the foundry of Elliot & Stutzman. The fire is supposed to have started in the cupola, as a heat had been run in the chimney yesterday afternoon, when it is likely that a spark dropped on the cupola, and had been smoldering since that time.—Williamsport (Pa.) Times.

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Trade Outlook.

Whether the buoyant feeling, pervading the iron trade, will result in an increase of work at higher prices to the foundryman, remains yet to be seen. Although the foundry business is supposed to have been somewhat "dead" for several years, it is surprising to note the number of new shops, which have been erected. Most of these have been constructed with a view of securing the most economical production, and in special lines of foundry work the cost of castings has reached a figure against which no general shop can hope to compete.

Nearly every foundry has some line of work, capable of being specialized more or less, and we believe that such action on their part will prove a shorter way of increasing profits, instead of waiting for public demand to raise prices. To tell the truth, the melting capacity of the foundries is enormously in advance of actual requirements. The foundries, like the blast furnaces, are tending towards larger plants with increased capacity. There will always be room for a large number of small shops, but the influence which these have exercised in the past are not likely to again return, nor will their output amount to but a fraction of the total production.

At the time of this writing the majority of shops are just reopening after the usual holiday vacation. If the future can be judged by reports furnished by sellers of pig iron and foundry supplies, there is every indication of busy times ahead.

Padded to Suit the Case.

The lockout of machinists in Great Britain has had a tendency to produce a voluble arraignment of figures to support the stand taken by either side in this controversy. The employers claim, among other things, that they cannot comply with the requests of their men because their competitors in trade, principally the United States and Germany, work their employes a greater length of time per day than the Britons.

It ought to be patent to every intelligent man that the length of the workday bears no definite relation to the cost of producing an article. If the question of industrial supremacy hinged on this point we should merely view a contest which would be determined in favor of the individual who could get along with the least rest and sleep. If the longest workday meant the lowest cost of production, not one of the present principal manufacturing countries would be heard from. The length of the workday, like the daily earnings of the individual, is no indication of the cost of labor. What is needed to determine the merit of the length of workdays and the advantage of a certain rate of daily wages, is to know the cost of labor per unit of output. The man whose physical condition permits him to work eighteen hours out of twenty-four is not necessarily worth more than another who works ten. Neither is a man working for two dollars a day absolutely more economical to employ than another who receives three. It all depends upon the quality and quantity of product which is turned out, and no reliable calculation can be made from a few common statements as is here attempted.

Nor do we have to go across the water to secure padded arguments of this character. A recent reduction in the cotton mills of New England is made necessary, the grave economists of that section tell us, by the fact that southern cotton mills are working longer hours. The same reasoning will

suffice against this compressed excuse that we made against the assertion of the British employers. No further reference would be made to the question but for the southern journals adding another padded argument thereto. In order to spread the advantages of the south over as great a surface as possible it is claimed that men can afford to work for less wages in that part of the country, because they can live cheaper. This would make it appear that the cost of living had some connection with the cost of production, and that the man who could contract his stomach to the greatest extent would be the winner. If such were the case it will readily be seen that the Chinamen, subsisting on three cents worth of rice a day, should be at the head of the class. We do not want to dispute the fact that a man can live cheaply in the south if he is satisfied to subsist on cornbread and salt pork, but we do deny that a class of people contented with such a fare would be the most economical artisans to employ. With wants to satisfy the worker is less liable to remain in that comatose condition so characteristic of southern labor, and an incentive to work for something besides mere existence is present wherever labor is giving the largest returns. All this tommy-rot about long hours, low wages and cheap living has no more relation to economical production than has a suit of clothes to the value of the man who wears it.

In this connection it may not be amiss to refer to the cost of southern labor as compared with northern as brought out in a congressional debate some time ago. The charge had been made that the main element in cheap production of southern iron was convict labor, to which a southern representative took exception, and, producing the report of the labor commissioner, showed that the labor cost per ton of iron in the south was $1.52, while in the north it was 5 cents less. This would not make it appear that the cost of labor per unit of output was lessened to any material extent in the south by the "cheap living" supposed to exist in that locality.

What Are We Going to do About it?

The jobbing foundry conducted at Rockford, Ill., by A. W. McArthur, under the name of the Rockford Foundry Company, a short time ago voluntarily retired from business. The Gazette of that city in commenting upon the permanent closing of the works says, after paying a high tribute to Mr. McArthur:

"The foundry business of the country has not escaped almost universal specialization which entered into modern business and manufacturing. An example of the cuts in prices which general jobbing foundries have had to compete with is shown in a recent contract for which the Rockford foundry was a bidder. The work was for a Chicago concern which manufactured mining machinery. They have a foundry specially adapted to their own requirements which turns out their work cheaper than any outside concern could and at the same time is a competitor to a certain extent on the market for general work."

That we are and have been passing through a transitory period of continual displacement and readjustment is evident. Nor has this rearrangement been one-sided. The master as well as the workmen has been compelled to change from established lines and seek either other vocations or change to methods but little short of a revolution. The man who is shouting that the foundry is making no progress acknowledges himself to every well-informed man to be an ignoramus. The very fact that concerns conservatively managed are being forced out of the trade is sufficient evidence to prove that someone else is getting more work for less money. There always will be a great amount of work, which must necessarily be classed as jobbing work, more on account of the limited number of castings wanted of each kind than because these are complicated; but this will be but a relatively small percentage of the cast-iron business. And we must confess that there is no relief from this condition of affairs, and that the laws governing our condition in this respect are as inflexible as the orbit of the planets. A man will continue to try and get the best of his neighbor in the production of castings as well as in politics, and the result in the former will be what it not always is in the latter—the best man will win—the man who can produce castings at the lowest price, quality considered, will get the bulk of the trade.

Nor is this struggle for supremacy confined to specialty shops and jobbing foundries. In a contest between the two the former has always come out the winner, but

the industrial campaign does not end here. Specialty shops find themselves opposed to one another, and the weak ones are again forced to retire. Methods in several lines of foundry work, which were considered impregnable ten years ago, are to-day regarded as obsolete. The assertion of many manufacturing concerns that they can buy their castings cheaper than they can make them is invariably true where the amount required is limited, or where the designs of these approximate closely to standard castings made in unlimited numbers by specialty shops. Against such odds it is obviously impossible to contest. But where castings are required in considerable quantities, of varying design, the specialty shop has no advantage, except superior management, over any other foundry in turning out the work.

The majority of manufacturing concerns who profess to be in a state of blissful ignorance as to how other foundries can turn out work cheaper than they can, are walking around with their eyes shut. We know of several such firms, manufacturing a standard article, who follow the same practice in turning out a thousand castings, which they would if only one was wanted. They have long ago discarded all cut and try methods in their other departments, their machines are built in sets to make the labor as productive as possible, but in the foundry the orders are to make one of this and one of that, keeping the men constantly changing. Let them do the same amount of specializing in the foundry that they have in the machine shop; there is room for just as much in the former, and they will soon cease to say that they can buy castings cheaper than they can make them. As it is, they can, and the sooner they do so, the less money will they lose.

The Gazette emphasizes this point when it says that a Chicago concern manufacturing mining machinery, having a foundry specially adapted to their own requirements, could turn out work cheaper than any outside concern. Why should they not? An outside foundry would not be likely to get a contract for more than a year, and could not for that length of time afford to construct as effective appliances for turning out the work as could the owners of the patterns, who were at least sure of retaining the work indefinitely.

It strikes us in this connection that the emigration to small towns from large cities by manufacturing concerns, looking for exemption from taxes and labor troubles, has not been attended with that success predicted for the general exodus. A locality is free from so-called labor disturbances only so long as its rural quietness is not invaded by labor, and low taxes does not insure a large bank account by any means. The place for manufacturers to locate is where commercial conditions require them, where they can purchase and sell to the best advantage, and this place will never be found in the center of a hayfield.

There is one feature affecting a general stability in the prices obtained for jobbing castings, and this is the large number of mushroom shops flourishing in all parts of the country. No man, who knew his business, would think of entering the manufacture of stoves without considerable capital to carry on operations. Neither would he establish a car wheel plant, a radiator shop or any of the standard branches of the trade. The very fact that considerable capital is needed to bring such foundries to a successful issue tends to establish a permanence of prices, which, although competitive, still reflects nothing but sound judgment. With an old boiler shell, a second-hand engine and blower and an old barn, some ambitious molder may start a jobbing shop, which will furnish a considerable amount of experience, not only for himself but legitimate foundrymen as well. Of course contracts taken against prudence can only result in the failure of such an operator, but the fact remains that its effects are visited upon those who have to contend against such blunders, and as a sucker is born every minute the show is almost continuous. It is here our strongest sympathies are aroused, where judgment, skill and investment are pitted against people who know not what it costs to produce work and accept contracts accordingly. We are perfectly willing that the best man should win, but we do regret to see a legitimate concern crowded by some mushroom plant, whose proprietor is satisfied to work for his board for a year or two, or as long as someone is willing to trust him with raw material. This kind of competition may be lawful, there may not be much of it, but a few rickety plants of this description can reduce the price of castings to a greater extent than would be thought possible from their limited capacity.

A Model Compressed Air Foundry Plant.

By H. M PERRY.

The value of compressed air for operating small motors on isolated and moving apparatus, especially when power is used for perhaps a minute or so in every ten, is beginning to be appreciated in this country as it should be, and hardly a week passes that does not record some valuable addition to the list of new applications of this nature.

This progress would be much faster but for the fact that usually a change to air power involves a considerable outlay for new machinery and the discarding of the old type, which may be in good or perfect condition.

A neat avoidance of this objection is shown in Fig. 1, which illustrates a foundry crane in the works of John J. Radley & Co., structural iron manufacturers, New York City. This was originally made to be operated by hand, but to it has been attached an air motor without changing the original gearing in the least, so it may at any time be operated either by hand or air.

The motor is reversible and of the direct-acting piston type. Its economy in the use of air is best illustrated by stating that the air compressor is stopped at the end of the day's work, with the air receiver (which is in this case a large boiler) fully charged, and sufficient air is thus stored to draw all their castings in the evening without running the compressor.

These progressive founders are, we believe, the first to successfully apply this method to every-day shop practice; and the fact that they have proven this possible should effectively remove the objection that has sometimes been raised, that it is "so hard to keep air from leaking away." If they do not use any air in the evening, they find nearly the same pressure on the gauge in the morning as when the compressor was stopped, which shows that joints can be made tight and that compressed air is favorable to keeping them so.

This little motor, which weighs less than 200 pounds, easily lifts 8,000 pounds ten feet per minute, and by changes in the gearing can be made to lift almost any load. In use it is protected by a sheet-iron case to keep out dust.

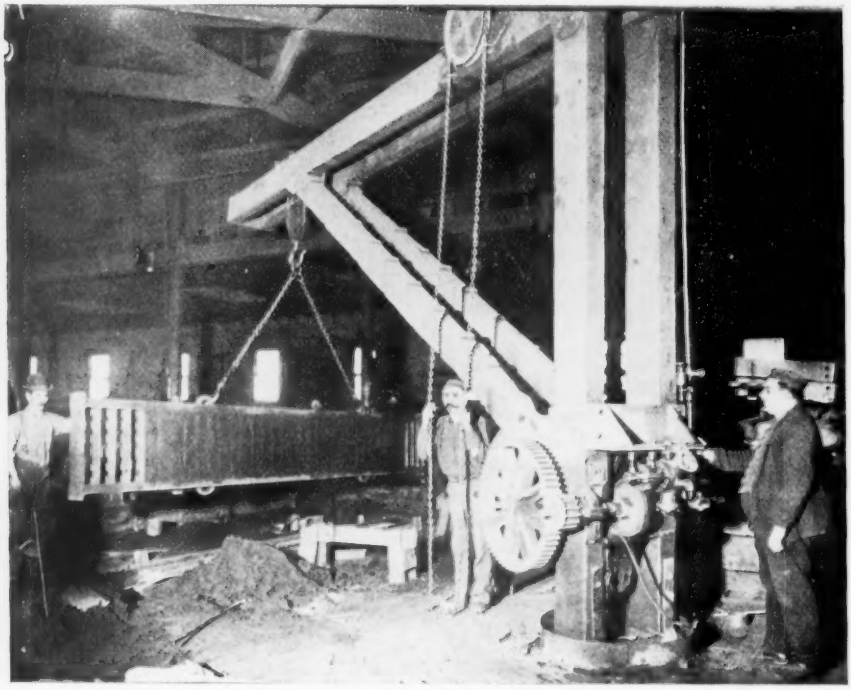


FIG. 1—COMPRESSED AIR MOTOR ATTACHED TO FOUNDRY CRANE.

These motors are used on traveling cranes for lifting the load and for moving the traveler along the track, and are well adapted to any light derrick work. For many purposes they are preferable to straight lift hoists, because they are not limited in the height of lift; use air only in proportion to distance load is lifted; hold load in constant position; do not jump up when part of load is removed, as in pouring molten metals; will do delicate mold work

carried out to the lifting sheave and back to a hand windlass on the mast. This windlass works on one end of the rope, or the air cylinder on the other end; so this, too, is either a hand or air crane at will. The ladle suspended on this crane is also of the improved Whiting make.

These people also use a Haeseler portable compressed air breast drill for boring test holes in cast iron columns.

Ample power for all these appliances is

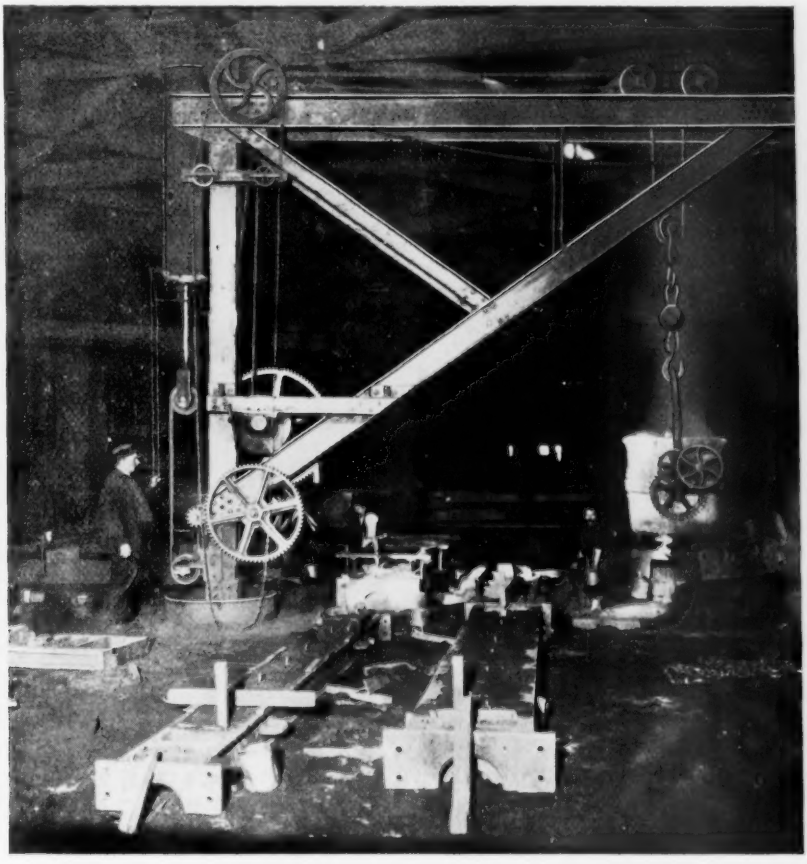


FIG. 2—CYLINDER HOIST ON FOUNDRY CRANE.

safely, and can be placed in close quarters where a cylinder hoist could not be used at all. For operating any light machine where it is inconvenient to get a belt, they should be very useful.

Fig. 2 shows another air crane in this same foundry, which embodies some original ideas of the owners, the chief one being the method of connecting the ropes; one end of the hoisting ropes is connected to a Whiting Foundry and Equipment Co.'s cylinder hoist, furnished by 10-inch belt-driven air compressor, which when air is not being used, automatically unloads itself, taking power only in proportion to the work being done in the foundry.

This entire compressed air equipment was furnished by the Ingersoll-Sergeant Drill Co., Havemeyer building, New York City.

[We are indebted to "Compressed Air" for the illustrations and descriptive matter appearing in this article.—Ed.]

Philadelphia Foundrymen's Association.

The regular monthly meeting of this Association was held at the Manufacturers' Club in Philadelphia on Wednesday, January 5, the president, P. D. Wanner, of the Reading Foundry Co., Reading, Pa., in the chair.

Secretary Evans asked those present to state their opinion in regard to the condition of the foundry business.

Mr. Thompson said: "We are not busy, but the past two months have been fair. The volume of business is good, but the prices are low, and the outlook is not encouraging."

Mr. Messick: "We are busier than we have been for a number of years. All our works are in full blast. Last year our business was altogether foreign. This year we are enjoying considerable domestic trade and a little foreign business. We have just introduced our paper machinery into Europe, where it is being enthusiastically received. We placed an order in Finland which revolutionized things there. Our machinery is also going into England, France and Germany, and we now have forces of men there."

W. H. Pfahler: "I am surprised to hear so many gentlemen complain that prices are not satisfactory. That in itself seems to me a sign of prosperity. The march of prosperity is along the line of lower prices. Nowadays the man with money to lend is forced to accept lower interest; the farmer is compelled to dispose of his product at lower rates, and so it goes. Between the cost of a manufactured article and the price of that article deposited in a bank, there will be shown a large profit, if the manufacturer can afford to lop off all unnecessary expenses."

Mr. Belfield: "I agree with Mr. Pfahler. We have adopted new methods to meet the new conditions, and we are making a profit. Instead of waiting for better prices, which may not come, we are pushing every opportunity that comes to us."

Mr. Devlin: "Affairs in our branch, the malleable iron branch, are not rosy. We have more business, but at lower prices than ever before."

Mr. Green: "In the crucible industry there are better prospects, but very low prices. However, money is coming in promptly and that's something."

President Wanner: "One thought has occurred to me that might bear dwelling upon. I have always regarded Mr. Pfahler as a very bold man, a very daring, but thoughtful man. There is one thing in what he says that challenges consideration. That is the labor question. When we realize that 90 per cent of all that enters into the cost of our products is labor, we must take it seriously into consideration. If we can convince labor that lower prices must prevail, then we are all right for the future. But if that is not believed, then there will be trouble. Such trouble would throw us back further than before. If you believe low prices to be inevitable, then go ahead. We are ahead of any country in the world in our manufactures, but there are certain conditions we must meet manfully."

Mr. George C. Davis, chemist of Thomas Devlin & Co., read a paper on

ANNEALING OF MALLEABLE CAST IRON.

The writer had the pleasure in May last of reading before this association a short article on "Malleable Cast Iron," with special reference to the chemical specifications. The most characteristic part of the process, the annealing, has not until very recently been at all understood. It was generally known that the carbon of the casting was oxidized by the oxygen of the packing, since the carbonic oxide could be seen burning at cracks in the luting during certain stages of the process, and further than that, analysis showed that part of the carbon had been removed. Several writers on metallurgy treat this subject in a very noncommittal way, saying that the oxygen of the air oxydized the carbon—a statement true enough where annealing in sand or like substances was the method described; but these writers carefully refrained from explaining how it was done in the Reaumer process. For if the air were the source of oxygen, we should hardly expect to find the packing reduced nearly to the metallic state, as it is in some cases. One writer in a book published in this city in 1872, advanced the idea that the dissociation of the carbonic acid contained in the gases of combustion was the true explanation, though his assertion was unsupported by any evidence. This view was at least plausible. Then the second difficulty was how the carbon in a solid body could combine with the oxygen of the packing—

a very stable substance not dissociated by heat—as it evidently did. The carbon from the casting for ⅛ inch or more had united with the oxygen of the inclosing packing, but how the two got together was an unsolved problem.

It remained for an English metallurgist to show that the process was one of diffusion. Thus if two bars of steel, one high carbon and one low carbon, are heated in contact with each other to a temperature of about 900 degrees C. the carbon diffuses gradually from the one to the other. This experiment was conducted in a porcelain tube in vacuo. And it is a similar diffusion that brings the carbon of the casting into contact with the oxygen of the packing.

At the meeting of the British Iron and Steel Institute held in May of last year there was presented by G. P. Royston a paper on "Malleable Cast Iron," which with the discussion that followed has doubtless been read with great interest by makers of malleable castings in this country. This paper, so far as it presents what we may call the practical details of the process, brings out certain marked differences between British and American practice, so comment from the latter point of view may be of interest. Both Royston and Hadfield take the ground that manganese in appreciable amounts is injurious. The pig iron used in the experiments contained 0.112 per cent. and the casting 0.043 per cent. manganese, thus showing more than the usual loss in melting. I have never found any good casting that was made in this country that ran as low as this, even those made from charcoal iron exclusively. The average analyses of three typical brands of charcoal iron for the past year show for the No. 2 grade 0.24, 0.32 and 0.45 per cent. respectively, and for the No. 4 grade of the same brands 0.19, 0.14 and 0.18 per cent. The leading brands of coke malleable run still higher in this element; one contains from 0.60 to 1.00, another 0.60 and a third well-known brand from 0.20 to 0.50. A few concerns use small quantities of pig containing 3 per cent. manganese, but this is with a view of producing a smooth and solid casting free from pin holes. We see from these figures that it is impracticable with the pig at our disposal to produce castings as low in manganese as is held to be absolutely essential by the British writers, even were this result desirable. And I do not think that it is. In this country the most common practice is to make a mixture containing from 0.40 to 0.80 per cent. manganese, which would give from 0.20 to 0.40 per cent. in the castings.

Whatever reason there may be for claiming that castings containing manganese anneal with difficulty, since carbide of manganese and iron is more difficult to decompose than carbide of iron, the fact remains that according to the writer's experience in actual practice castings of the composition mentioned above, are annealed without the slightest trouble, the combined carbon being below 0.10 and frequently only a trace; the graphite of course depending on the cross section of the casting and time of annealing. A number of tests and analyses by a Western concern show silicon, 0.75 to 0.98 per cent.; manganese, 0.35 to 0.53 per cent.; tensile strength, 39,600 to 53,700 pounds; elongation, 3.85 to 7.83 per cent. Unfortunately, the carbons are not given, but it is obvious that to obtain these results the annealing must have been good. Sulphur, if present in large amounts, interferes with annealing, as was shown in a paper by H. R. Standford, read before the American Society of Civil Engineers in 1895.

In melting iron in an air furnace using a coal containing 1.12 per cent. sulphur I found the metal gained not over 0.03, so that the casting never ran over 0.06 per cent. Some castings are made from iron melted in a cupola, and here it occasionally happens from bad fuel or irregular melting of the sprues in the charge that the sulphur runs too high. In a previous paper I referred to an extremely tough casting containing 0.121 per cent. sulphur. This casting was about ⅛ inch thick, and had the carbon practically all removed. In the case of a thicker casting where the annealing did not remove all the carbon I found a slightly larger amount of sulphur sufficient to prevent complete annealing. A casting ⅜ inch thick after once annealing showed sulphur, 0.133 per cent.; graphite, 0.547 per cent.; combined carbon, 0.515 per cent.; after a second annealing, graphite, 0.505 per cent.; combined carbon, 0.380. Using the best fuel obtainable and the greatest care in charging it is possible to melt iron in a cupola without adding more than 0.03 per cent. sulphur.

but I find that few works can show as good results as this, and more often 0.06 or over is added than the former figure. West Virginia coke running from 0.50 to 0.65 per cent. sulphur and Connellsville at about 0.85 per cent. can be easily obtained, so it is entirely practicable to produce castings from cupola metal running below 0.11 per cent. sulphur, an amount not objectionable in the class of castings made from this iron.

The difference between Reaumur's process, where the carbon is wholly or partially removed, and the process described by Forquignon, where it is simply changed to graphite or decarburized and transcarburized respectively (as one author puts it), is fully brought out in the discussion of Mr. Royston's paper. Many manufacturers of malleable iron in this country do not understand this matter. Some of them use various processes for annealing which do not decarburize to any appreciable extent, under the impression that they are producing Reaumur castings. A number of processes for the production of malleable castings have been proposed by men ignorant of the rationale of the Reaumur process. It is impossible for commercial reasons to discuss them here; suffice it to say they are no improvement and many are obvious frauds, such as the addition of mysterious fluxes in the furnace or ladle just before pouring. In the discussion Mr. Hadfield takes issue with Mr. Royston, who says no bend can be obtained if the graphite is present as in the so called black heart castings such as are produced by annealing in sand or bone ash in luted pots. Mr. Hadfield instances a casting made in this country containing 3.07 per cent. graphite, which could be bent in a manner approaching soft steel and had wonderfully good resisting properties to sudden blows. My own experience agrees in the main with Mr. Royston. While castings containing large amounts of graphite will sometimes bend well, I have never found them as tough as decarburized castings containing equal amounts of the other weakening elements, silicon and phosphorus.

In this country roll scale is used as a packing in preference to ore for several reasons. Ore sufficiently low in silica would be more expensive for works located east of the Alleghenies. Mill scale requires no grinding or other preparation than to oxidize or rust it, as the common saying is, with a weak solution of sal ammoniac. Instead of mixing three or four parts of spent ore with one of raw ore ground to the size of a pea, as described by Mr. Royston, it is the common practice to spread the spent packing on the floor and sprinkle it with a weak solution of sal ammoniac so that the mass becomes oxidized. This spent packing is, of course, finely divided as it falls through the crevices in the tumblers into which the whole charge is placed. The oxidized mill scale is added from time to time, as there is always some loss in handling the packing as dust and in other ways. So far as the pots are concerned no special mixture is made for them. They are cast from cupola metal, if this is available, and last five or six heats, depending on their position in the furnace. A number of types of annealing furnaces are used. Probably in the most efficient type the fire is built in furnaces along one side, the gases entering near the top, passing across the furnace down the opposite side and out of the ports to by-pass flues underneath the floor and finally to the stack. Thus all sides of the furnace are heated to a nearly uniform temperature.

Mr. Royston refers to the question of scaly castings without covering the whole ground. In speaking of annealing in sand or bone ash, he says: "The reaction taking place between the carbon and the iron should be $C + O = CO$. Should it be $C + O^2 = CO^2$, the iron will also be oxidized by the carbonic acid and the casting will be scaled." To put it in other words: If you use too much air you will burn the castings. Continuing, the author says: "Where oxides of iron are used as a source of oxygen the carbon monoxide partially reduces the iron oxide to the metallic state." This sentence is of doubtful meaning, but I take it that he intended to say reduces the iron of the scale to the metallic state. It frequently happens that where a number of small castings are annealed in ferric oxide in the same pot some will scale and some will not. I have never found a scaly casting that contained the amount of manganese usual in good castings, and I believe that this element acts to prevent scaling, at least when annealing in ferric oxide. Thus in one case, a scaly casting showed 0.08 per cent., and a good casting 0.27 per cent. manganese, both being annealed at the same time. With regard to phosphorus, if the Lorn pig used in Mr.

Royston's experiment is one of their representative brands the English founders seem to be running lower in this element than is necessary. I certainly do not believe in adding phosphorus ad libitum, but in this country the usual specification is 0.20 or less, and certain it is that castings containing 0.18 (that is about a fair average figure) show excellent results.

No discussion followed this paper.

Geo. H. Robbins, of the Clement Pneumatic Tool Company, Philadelphia, read a paper on

"IMPROVED PNEUMATIC TOOLS FOR FOUNDRY USE."

The use of pneumatic tools for cleaning and chipping castings is not new. Certain defects in the old style of construction, the want of knowledge of how to operate them, together with the prejudices of ignorant workmen, have resulted in eight cases out of ten in the condemnation of the tools for foundry use. The first thing we will deal with will be the objectionable features of the old style of tools, of which the recoil or kick was the most noticeable. This recoil or kick has done more to prevent the adoption of large sized pneumatic tools than anything else, as it has enabled the workman who is afraid of losing his place to say, with some appearance of truth, that holding the tool was injurious to him, producing paralysis of his arm, etc. To this, and here, let me reply that I know of men who have been running pneumatic tools continuously for the past five years, and who have not been affected in the slightest by them in any way whatever. The improved Clement valveless tool is so constructed and so evenly balanced that all kick has been eliminated from it, because it has an air cushion so placed that when in operation the workman is really pushing against air, the elasticity of which takes up all shock and vibration.

Another important objection that is made to the old style pneumatic tool is that so many small parts, valves, springs, etc., enter into its construction. Such a number and variety of parts make the tool very delicate and liable to get out of order.

The improved Clement valveless tool consists of but three parts or pieces—a cylinder that is bored out of a solid piece of steel, a hammer or piston made of tool steel and a butt piece or plug to close the end of the cylinder. The only part of it that moves is the hammer, and that is not dependent on the movement of any other part for its own motion. If it is given fair treatment and regularly oiled it can be depended on for a long period of steady and reliable service, and knowing this we are warranted in guaranteeing it against all repairs for two years. This, I trust, shows plainly and conclusively to any investigator that the objectionable features in the pneumatic tool of the past are not to be found in the improved Clement tool of to-day.

Let me now speak a moment of the ignorance of operating, and the prejudice existing against pneumatic tools and the reason therefor. No doubt some of you have had pneumatic tools tested in your foundries and perhaps unsuccessfully. Have you, however, considered in such a case how this test was made? Pneumatic tools are made in many sizes, and to use them to advantage they must be used for the purpose to which they are adapted—that is, a small tool for light work and a large tool for heavy work. Then again, at what air pressure did you try this tool? Do you know whether the pressure used was high enough to develop the efficiency of the tool? And, last, but not least, in whose hands was the tool placed for trial? Was he a man who would work for your interests, forgetting his own, or was he opposed to the tool because it was a labor-saving device and because its adoption was liable to bring about the discharge from employment of himself or some of his shopmates? These are all-important considerations, and may explain to you why the test of pneumatic tools in your shop was a failure, if such it was.

The best way to introduce the tools is to place them in the hands of young men, who are, as a rule, ambitious, and who will take a pride in running a new machine. Let them know that the successful operation of the tool will mean a slight advance in their wages. If on the contrary, however, you give the tools to a man who believes only in old hand methods, the amount of work that he will turn out will be small, comparatively speaking. The average amount of work that can be done with these tools is as follows: In removing sand from large and heavy castings, one man with a medium-sized tool, and a broad chisel, can readily do as much work in a given time as six men could do by hand methods.

One man with a tool can do as much light fin-chipping as is usually done by five men in the same period of time; and when it comes to rough or heavy chipping, one man with the proper sized tool can do about the same quantity of work that is generally done by three or four men with the hammer and chisel.

It is sometimes necessary to do chipping to a line, or true surface. A man who is skilled enough to do this class of work with a hammer and chisel, can accomplish just twice as much in the same time by using a pneumatic tool for the purpose. The operator has absolute control over the tools used for this fine work; striking a light or heavy blow, as he desires; governing the force of the blows by the simple pressure of his hand, and not by throttle valves, etc., that are so liable to wear out.

If anyone should doubt the possibility of the operator being able to cut to a line, or having this perfect control over the tool, it affords me pleasure to refer you to the marble and granite cutter, who not only does the most delicate carving and lettering with the tools, but does it on a substance that is vastly more friable and brittle than cast iron.

Before concluding, I ought perhaps to say a few words about air plants when used in connection with pneumatic tools. In the first place, an air compressor, an air receiver, and a lot of different sizes of pipe strung around a shop, do not always constitute either an efficient or economical air plant. To get the best results, you require:

First. An air compressor of approved pattern, of sufficient size and power to develop and maintain a steady pressure of 80 to 100 pounds to the square inch.

Second. An air receiver of sufficient size to equalize the pulsations of the compressor, and to cause the air to flow with uniform velocity to the tools.

Third. As air in its passage through pipes is subject to friction, in the same manner as water, it is important that your pipe system be carefully designed, as loss by friction may be quite serious. In calculating such loss, it would be well to remember that the difference in pressure between the entrance to the pipe and the point of use, termed in hydraulics "loss of head and power lost," is not applicable to compressed air. Compressed air will lose 10 per cent of its head, but the loss of power will only be about 3 per cent. The reason for this is simple, when you remember that compressed air as it loses in pressure gains in bulk, and thus in a measure by its increased volume compensates for the diminished pressure.

DISCUSSION.

Howard Evans: You do not mention the amount of power required to drive the compressor, nor state the saving over hand work where tools are used. You only say that one man can with one tool do so much more work than by hand.

Mr. Robbins: An air compressor of a size sufficient to operate say three tools, 14-ounce hammers, would require four-horse power to run it—that is, a belt compressor. When a small compressor can be used it is much more economical to run it by belt power than by steam direct. The cost of such a compressor would be in the neighborhood of $180. The cost of the air receiver would be about $40, while the cost of the pipe would depend altogether on the distance the air was to be carried; if 100 feet say $5. Three tools of the capacity mentioned would cost say $300. A total cost of about $525 for the equipment.

Mr. Evans: Where people have a compressor in use the adoption of these tools is accompanied with considerably less expense, is it not?

Mr. Robbins: Certainly. I have here a small 2-ounce tool the earning capacity of which is $900 per annum. That is the earning without the expense. The tools actually save the labor of one man for 300 working days in the year. The outfit I have mentioned is large enough to run six of these tools. In taking sand off castings you would require a broad chisel like this (showing a chisel with about 2-inch cutting edge).

Mr. Messick: Are the tools in use in this city?

Mr. Robbins: Yes. They are used at Cramp's, and at the works of the Warden Mfg. Company, in both boiler shop and foundry. They are used in shipyards for chipping and calking. When used for calking a man can calk 60 lineal feet per hour. On boiler work about 40 feet. It makes a tighter joint than is possible by hand, the blows not being so hard, but multitudinous. The tool I have shown you uses 10 feet of air per minute at 80 pounds pressure. It can be

operated with a pressure as low as 60 pounds, but high pressure is the best, the resulting work being much more efficient.

Mr. Messick: Did you ever try driving rivets with them?

Mr. Robbins: Yes, what you call shell rivets, ¾-inch cold rivets. A 6-pound hammer will drive them faster than you can put them in the hole.

Mr. Eldridge: Supposing one wished to knock off a riser from a casting, say a riser 2 inches in diameter, would you smooth the casting with the tool as well?

Mr. Robbins: A sledge would be better for knocking off a gate of that size. After the gate is knocked off you can smooth down with the pneumatic tool.

Mr. Evans: Supposing a foundryman having a compressor wished to try these tools, would you give him a trial?

Mr. Robbins: Certainly. He could have them for ten days on trial, and we would visit his foundry and impart all instruction possible.

CORRESPONDENCE.

PHOSPHOR BRONZE.

Will some of THE FOUNDRY'S readers kindly give me a mixture for phosphor bronze? B. H.

BEAT THIS IF YOU CAN.

Editor THE FOUNDRY:

This article will no doubt be of interest to a great number of your readers as our foundry practice differs from ordinary methods. The time of melting and the dimensions of our cupola also vary from established practice. Our cupola is a Whiting No. 2½, 41-inch shell, height of charging door from tap hole 9 feet 6 inches, number of tuyeres 6, 2 lower and 4 upper; lower tuyeres are 18 inches from the bottom while the upper tuyeres are placed 15 inches higher. The cupola is lined with two courses of brick, and an additional lining of sand, rammed firmly around a tapered plug, 14 inches at bottom and 17 inches at top. Our object in lining the cupola to such a small diameter is to save coke, and is also made necessary by the fact that we need a steady quantity of iron throughout the day instead of a larger amount in a few hours. We have no set quantity to melt, as changing conditions, frequently occurring throughout the day, have to be met by a corresponding change in the cupola practice. The class of work we manufacture is small chill castings, the largest not exceeding four pounds in weight. As all of the iron is taken away in hand ladles, holding from 30 to 35 pounds, and has to be carried up to about 90 feet from the cupola, it is an all-important point that the iron shall be hot, as it must be poured very slowly, otherwise the result is a blown casting.

Our practice is to start the fire in the cupola at 4:30 a. m. with from 250 to 300 lbs. of coke on the bed, on which is charged from 100 to 125 lbs. of pig and 300 lbs. of scrap. The blower is started at 6:30 a. m., the following charges being made up of 30 lbs. coke, 100 to 125 lbs. pig and 400 lbs. scrap, with from 15 to 25 lbs. of limestone to each charge. The slag is removed, as fast as accumulated, through the slag hole, which is kept open all day. At noon the tap hole is knocked out large enough to allow the remaining slag to be blown off, when the cupola is filled up with coke, from 250 to 300 lbs. being required to put it in condition to receive the first charge following the noon hour, after which the practice of charging is the same as already explained of the forenoon. We melt until 6 p. m., when, instead of dropping the bottom, as is usual, we knock out the breast, which is built of coke and sand, having a plate and strap to hold it in position. This part of our practice becomes necessary owing to the small diameter of the cupola. The sand bottom is heavy and built steep so as to run the iron directly to the tapping hole.

The average amount of iron melted per day is about 22,000 lbs., consuming 2,100 lbs. of coke and 1,000 lbs. of limestone. From this ought to be deducted 300 lbs. of coke used at noon, in order to obtain the actual melting ratio, as this amount of fuel is used simply to keep the cupola in condition during the noon hour and is not consumed in melting. This would leave a melting ratio of nearly 12½ to 1, though I have on several occasions, when everything has been in good shape, melted as high as 15½ to 1. I may here remark that it is often necessary to tap out for a single ladle, but generally there are four or five at a time. On some days I have had the tapping hole open for two hours before stopping up at all.

The average amount melted in one week is about 149,521 lbs. of iron to 12,715 lbs. of coke. Deducting 300 lbs. of coke per day, as not being consumed in actual melting, gives us a ratio of nearly 14 to 1.

This is only an average practice without any special preparation. There is no guess work about our melting, as everything is weighed under as perfect conditions as possible. I have frequently melted as high as 16½ to 1, but not often.

I would like a little information from our foundry experts on the following:

Would I gain any advantage by putting 3 courses of tuyeres in the cupola, distributed as follows: Two at the bottom, 15 inches above the tap hole; 3 in the next course, 12 inches higher, and another 3 at a further distance of 12 inches? The reason I ask is, because in the standard make of cupolas the tuyeres are too close together for the diameter of the cupola, being only about 15 inches from the bottom and the next course 15 inches higher. With this condition the cupola would bung up unless very carefully watched and obstructions knocked away. It seems to me that by distributing the tuyeres in the manner mentioned the lining would not burn out as fast. We line up, once a week, with sand about half way to the charging door.

E. J. BAKER.

Foreman North Western Wire Mattress Co., Kenosha, Wis.

Testing Car Wheels.*

These tests demonstrate the progress made in recent years by the companies named in the production of chilled wheels of grades above the ordinary standard.

To prove the quality of chilled wheels it has been the usual custom to subject them to the ordinary test of breaking under repeated blows with a sledge hammer, or to the Master Car Builder standard test. Such tests do not prove value in all of the important requisites for service; the sledge test indicates strength of metal, and the M. C. B. test proves the ability to resist shocks and blows delivered at right angles to the line of strain in service instead of ability to resist the actual shocks received. Both tests are relatively valuable, but neither has any particular reference to the existence or absence of conditions which generally cause failures. It is also possible that in having the value of the wheels determined by them, there is danger of concentrating the principal efforts of manufacturers on the production of wheels which may be well constructed for testing purposes, but not to resist the strains of service. No doubt considerable practice of this kind exists now, particularly with wheels made for use under new equipment. Car builders are obliged to buy wheels at the lowest possible prices, and in many cases no tests of any kind are called for. This has resulted in the manufacture and use of large numbers of chilled wheels in which price has been the main consideration. In consequence, railways have been influenced in regard to the price paid by them for wheels by the low prices paid by car builders. It is evident that whatever may be claimed as the result of such practice, it certainly leads away from the production of wheels adapted to meet the increasing demands of service.

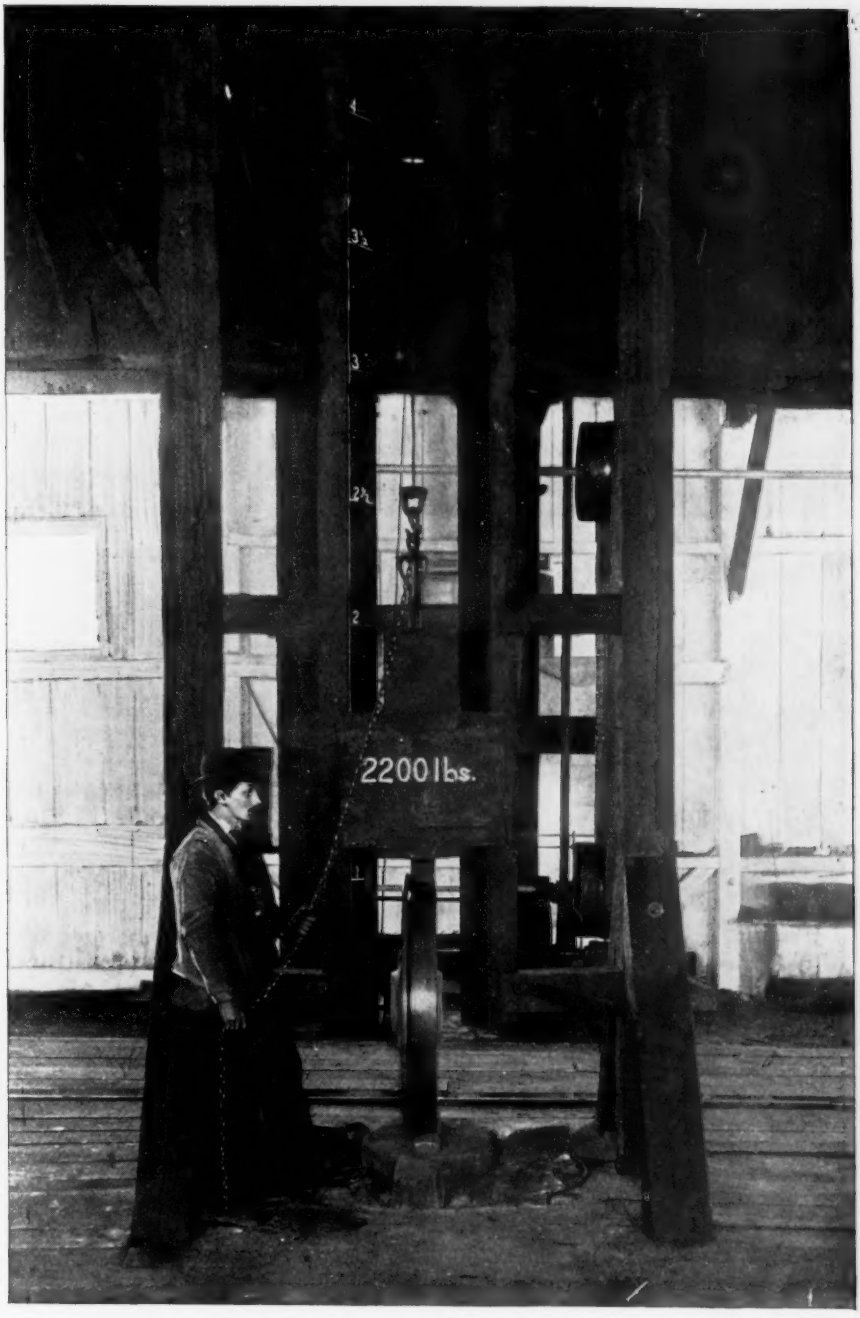
Practice of this order has, in a large measure, prevented progress in the manufacture of chilled wheels in recent years, and has created the impression that they were not adapted for high speed and special service. The result of the series of tests given herewith throws considerable light on the possibilities of high-grade chilled wheel manufacture.

In America steel, or steel-tired wheels, are not tested before service to any extent, if at all. Wheels of this class seem to be accepted without tests on the basis of a general belief that they are better than chilled wheels, because of the material composing them and their style of construction.

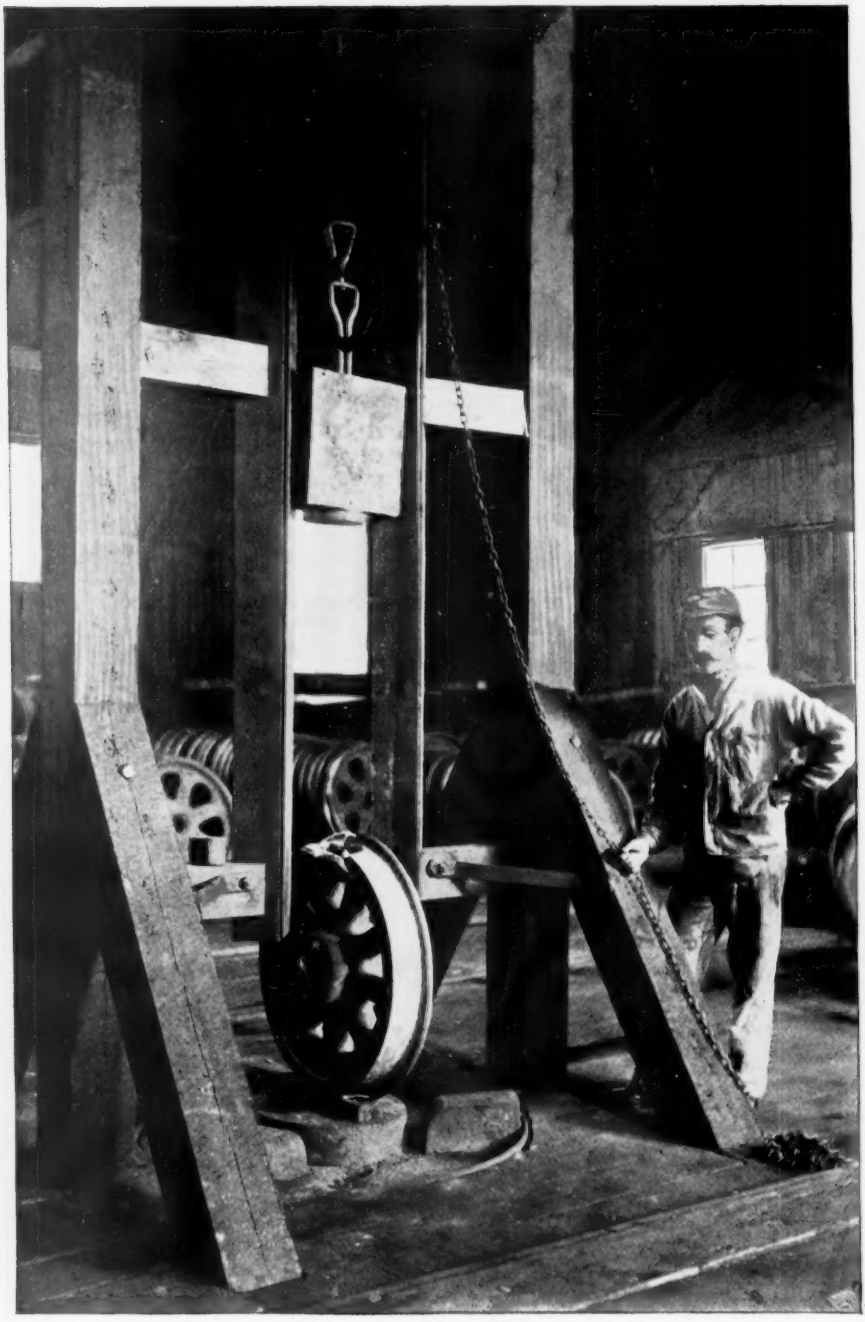
Such an opinion is well founded if chilled wheels are to be classed as all of one quality; but when chilled wheels of the best quality are compared with steel wheels, taking all kinds of the latter into consideration, the case is quite different. At present the steel wheels used in America are of the best and most expensive description, and the average quality of chilled wheels, including everything used under that name, is perhaps the best possibility of practice under very unfavorable conditions.

This company has pursued steadily the policy of undertaking to advance the possibilities of the manufacture of chilled wheels

*From a pamphlet issued by the New York Car Wheel Works, of Buffalo, N. Y., entitled: "A Series of Tests Made by the P. H. Griffin Machine Works, of Buffalo, N. Y., on November 8, 1895, with Special Qualities of Wheels made by the New York Car Wheel Works."



Machine used for tests under Austrian, German and French specifications, showing divisions by metres and half-metres. Total height of drop six metres. Photograph shows but two-thirds of full height.



Thirty-inch Engine wheel, special quality, Lake Shore & Michigan Southern standard. Showing weight in position under Austrian State Railway test.

Austrian State Railway Test: Wheel placed upright on heavy iron and stone foundation. Weight of 475 pounds dropped from varying heights, commencing at one metre and increasing by half-metres to six metres (about 20 ft.). Wheel required to stand eight blows in all.

in all possible respects. The work led in the first instance to the improvement of mechanical conditions, and practically at a date five years ago that object was successfully accomplished from every point of view.

This improvement consisted of turning or grinding the treads true to center and of balancing all wheels to any desired exactness. As against these improved conditions current practice was, and is now, to use wheels one-sixteenth to one-eighth of an inch out of round, and from two to twenty pounds out of balance. The M. C. B. rules provide circumference tests for wheels, but they are seldom if ever applied. There is little doubt that many wheels go into use that are considerably more than one-eighth of an inch out of round. What this calls for in the way of additional power may be imagined. By means of our special machinery the cost of doing the work of finishing wheels is below that of similar operations on ordinary castings and the mechanical conditions resulting are of the highest order.

At an early date in the work it was found that the greatest strength obtainable from best qualities of charcoal iron was a variable quantity and that much of the variation occurred for reasons beyond the control of the iron manufacturers. With the best qualities it was found that a breaking load of 3,000 pounds on test bars one inch square by twelve inches long, represented the highest strength that could be obtained in current practice. To obtain greater strengths seemed for a considerable time practically impossible. Notwithstanding every inducement held out to makers of the best qualities of iron they were disinclined to undertake expensive experiments and operations in the effort to produce qualities of metal above the best ordinary practice. After spending a number of years in fruitless work of the kind it was finally decided to make an exhaustive study of the whole subject and to undertake the work ourselves. This involved extensive experiments and trials of many kinds of ores and metals, and it soon became evident that modern improvements in the manufacture of pig iron, while lowering the cost and increasing the output in a corresponding degree, had made it impossible to secure the higher qualities desired; it therefore became necessary to investigate an earlier order of practice to determine the lines on which the results had been obtained with cruder appliances, which it seemed impossible to obtain with the more modern.

Particular attention and study was given to the conditions under which the early manufacture of Swedish pig iron had been conducted, and among other things it was found that the use of what are known as bog ores had been an important factor, and that the iron, though produced in very limited quantities, nevertheless possessed remarkable qualities in both the raw and the manufactured state.

We finally decided to undertake experimentally the manufacture of iron from bog ores, and sufficient deposits were found in Canada in the Laurentian mountain district of the Province of Quebec. It is particularly interesting to note in this connection that over one hundred and fifty years ago the manufacture of iron from bog ores was one of the most important of the early industries of the Province of Quebec, where it was carried on under the patronage of Louis XV. of France. The quantity produced was so small as to seem absurd in these days of great iron production, but at that time it proved sufficient to enable the carrying on of an industry that was referred to by writers of the day as one of the most important of its kind. From the practice of 100 years ago to the practice of to-day is a very long step, and that in a furnace built in the eighteenth century iron would be made at the close of the nineteenth century, even experimentally, seems quite impossible. Such was the case, however, for in the old stone furnace at Radnor Forges experimental work was carried on for nearly two years. This furnace was practically the last surviving evidence of the early work referred to. It had produced from bog ores a limited quantity of what was known as Three Rivers iron—the daily capacity was from two to four tons, and in the past thirty or forty years it has been operated intermittently for the supply of small local requirements. The property was acquired, the old furnace put in thorough repair, and experimental operations were conducted for two years. The results obtained were so satisfactory that the Canada Iron Furnace Co. was formed, a new furnace with a daily capacity of 50 tons was erected, and put in successful operation in the month of March, 1892. Undertaking to run a furnace of such capacity exclusively on bog ores was not an easy matter on account of the nature of the ore; in fact, it was the first attempt to operate on such a basis that had ever been made in the history of the manufacture of iron with this class of

Thirty-inch spoke wheel, special quality, Lake Shore & Michigan Southern standard. Condition of wheel after receiving 16 blows from 475-lb. weight under Austrian State Railway specifications.

It will be noted that the test requirement is for wheels weighing 800 lbs. and over. This test made on wheel weighing 590 lbs.

Special quality 39-inch wheel, weight 840 lbs., in position for first blow under German State Railway specifications. Hub bored to receive conical steel sections with interior tapering steel wedge, all machined and accurately fitted.

German State Railway Test for Cast Steel Wheels: Wheel placed horizontally supported on wooden blocks—tapering steel wedge being placed in bore of wheel. Weight of 440 lbs. dropped from varying heights on this wedge, commencing at 1½ metres and increasing by half-metres to four metres. Wheel must stand six blows in succession.

In this test a weight of 475 lbs. was used. It should be noted that the strains imposed by each blow are retained and increased by each successive blow, and the test is thus made more severe than it would appear to be. This wheel stood 16 blows.

ores. To collect the quantity of ore required was in itself a formidable undertaking.

Bog ores are found on or near the surface of the ground or on the bottom of the lakes; the deposits are irregular, and although the formation is continually progressing, the rate of accretion or precipitation is very slow. It became necessary, in order to provide for the requirements of the work, to practically survey 10,000 square miles of territory, to test all lakes and small bodies of water within the same, and to provide for the collection and handling of the ores over the wide area necessary to be dealt with. It was also necessary to provide for many years to come in regard to the ore and wood supply, in order that the industry once established could be successfully continued and extended.

All of this was accomplished in due course, and to-day the manufacture of a special grade of charcoal iron made exclusively from bog ores is one of the vigorous industries of Canada. The iron is rapidly finding a market in the United States and abroad as well as in Canada, and the product of the Canada Iron Furnace Co. is in demand by manufacturers to whom quality is a more important consideration than price.

A comparative idea of the quality of the metal may be gained from the fact that on the test before referred to (breaking load on bars one inch square by twelve inches) 4,000 pounds is readily obtained from test bars in the pig bed direct from the furnace and greater strength from remelting.

The question of obtaining increased resistance to wear in chilled iron was intricate and difficult. It has long been known that the hardness of chilled iron varied in marked degree in ordinary practice, and it was necessary to take up this question in an exhaustive manner, that a basis of ordinary practice might be laid down thoroughly and technically as a ground work for the higher results aimed at.

No reference has been made thus far to analytical work in connection with the whole subject, but it was carried on continuously with complete appliances and the most experienced chemists. Results were also proved by comparative work with eminent authorities elsewhere. Microscopical work was carried on, and of late years has been extended very considerably, particularly in the study of the physical composition and structure of the different qualities and kinds of chilled iron. To properly grasp the whole subject it became necessary to make elaborate tests of results obtained from standard mixtures in which were present the ordinary constituents, as well as from special mixtures to which unusual elements were added.

It has required a number of years to actually demonstrate the value of this work, and as this had to be proved by results, until the latter was secured, it was thought best to defer the presentation of any claim in regard to its value. While it would be impossible to enter into the details as carried on in the past eight or ten years the present results may be judged by the records of a series of tests made on November 8, 1895, by the New York Car Wheel Works and the P. H. Griffin Machine Works, at Buffalo, in the presence of a large number of members of the Central Railway Club.

These tests were conducted under the general supervision of the members of the club, and under the inspection and direction of three railway officials selected by the club, a partial record of which is furnished in the description of each illustration.

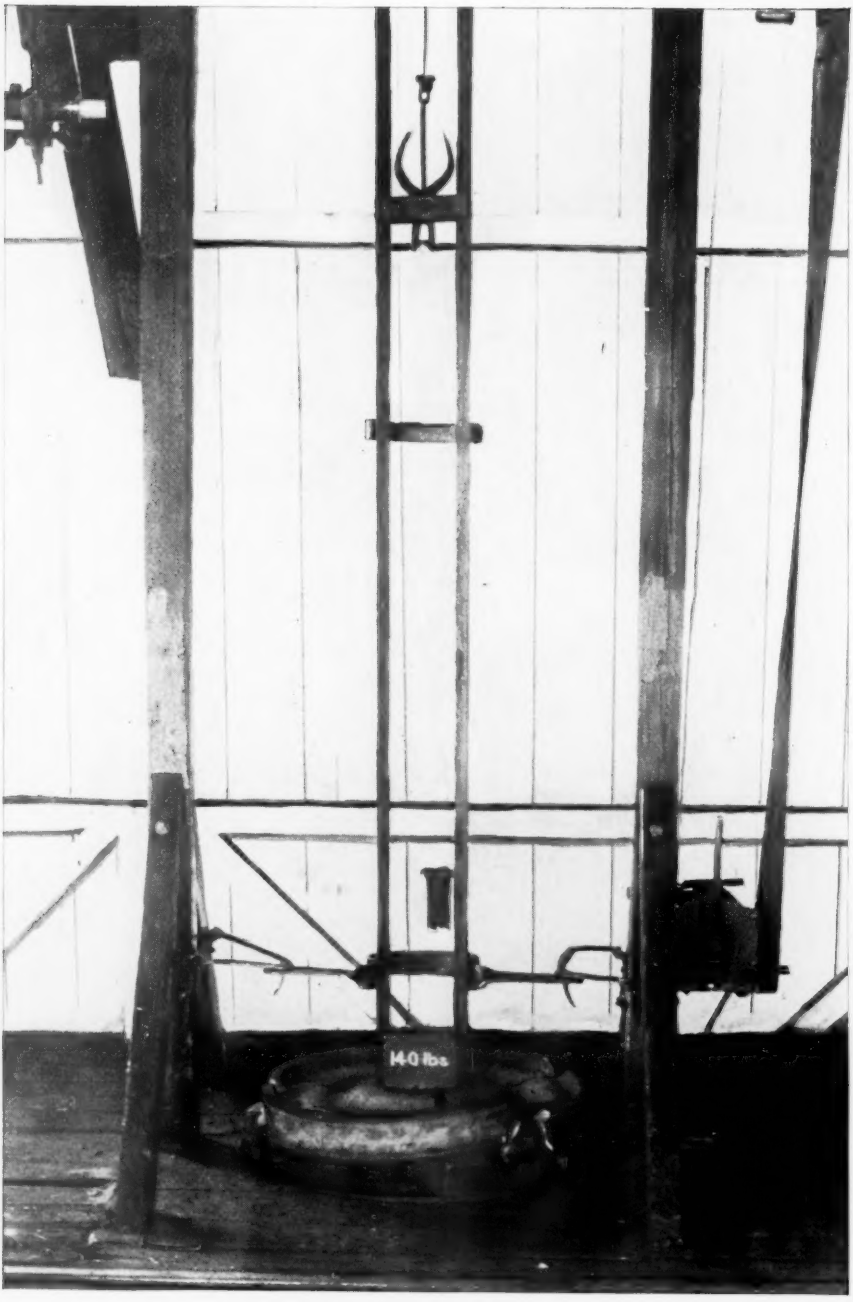
The results demonstrate conclusively that there are possibilities in the manufacture of chilled wheels from special qualities of metal so far beyond results heretofore obtained as to virtually place the chilled wheel above the best makes of steel tired wheels in the important factor of safety. This may seem a strong statement to make, but it is based not alone on the results of tests as shown, but upon the service obtained from a very large series of wheels out of which there has never been a single case of breakage in service. The most severe test of the wheels of special quality referred to has been made during the past five years under 100-ton locomotives on the Michigan Central Railroad.

The importance of this whole subject should be judged from the standpoint of the comparative number of steel and chilled wheels in use in America. Poor's Manual of American Railways gives the total number of freight cars in service in 1894 as 1,191,806, and it is a well-known fact that all of those are equipped with chilled wheels. Not more than one per cent of the total number has less than eight wheels per car, and to the total must be added the number of chilled wheels used under passenger, baggage, express and other cars, as well as those in use under locomotives. The total number of chilled wheels in use must therefore be nearly ten millions at the present time.

Special quality, 42-inch wheel in position for test under specifications of French State Railway, for steel tires.

French State Railway Test for Steel Tires: Tire placed upright on heavy iron and stone foundation. Weight of 2,200 lbs. dropped from a height of 4½ metres (about 14 feet 8 inches). The tire must stand 3 blows without breaking.

This test was applied to New York Car Wheel Works' special chilled wheel, 42 inches diameter, weight 1,075 lbs. Wheel stood 6 blows—twice the test requirement.



Special quality 32-inch passenger wheel, weight 1,075 lbs. Broke at 263d blow under Master Car Builders' test.

Master Car Builders' Standard Test for American Railroads: Wheel placed horizontally on heavy iron and stone foundation. Weight of 140 lbs. dropped from height of 12 ft. on hub. Wheel required to stand five blows without breaking.

The grand total of all steel wheels used under passenger car equipment and locomotives is given in a report to the Master Car Builders' convention of 1894 as 67,600. Provided that the same proportion was maintained in the balance of the equipment not reported upon, it would bring the total number of steel wheels in use to about 112,000, or one and one-tenth per cent of the number of chilled wheels in use.

The strong desire of American railway officials to supply the best material for special service has undoubtedly led them to make extensive experiments with steel wheels in the past ten years. Presumably the quality of a very high-priced article should be better than that of a lower-priced one, and the extensive use of steel wheels in Europe has favored trials of them in this country. The question will nevertheless be determined on its merits in due course, and the best wheel will be used regardless of prices or claims for supposed quality. It will be, to say the least, an unusual condition in railway practice to find that better service can be obtained with a large reduction in expenses, but that is precisely the case with steel-tired and chilled wheels under any conditions of price that ordinary or special qualities of the latter are likely to bring. The value of the chilled wheel when worn out bears so large a proportion of its first cost as to bring the net expense of wheel service to an exceptionally low figure and one with which the manufacturers of steel wheels can never hope to compete.

The series of tests referred to consisted in subjecting special grades of chilled charcoal iron wheels to the tests imposed by European railways on steel tires and cast steel wheels; in every case the special quality of chilled wheels not only stood the test requirements but went beyond them. The wheels tested were made of mixtures in which the quality and depth of chill were of the highest standard. This fact is of the greatest importance, for if it was merely the intention to make wheels in which the factor of strength would be high, that result could have been obtained with an order of practice very simple in comparison.

New England Foundrymen's Association.

The New England Foundrymen's Association to the number of 40 attended the annual dinner at the United States hotel, Boston, Jan. 12. President George H. Gibby was in the chair. The speech of the evening was made by Walter B. Snow, who talked on the use of the blower in the foundry. The annual meeting was also held, and the following named officers were elected: George H. Gibby, of East Boston, president; W. O. Barbour, of Cambridgeport, vice-president; Fred F. Stockwell, of Cambridgeport, secretary; George H. Lincoln, of South Boston, treasurer; F. B. Farnsworth, of New Haven, Conn.; A. P. Baker, of Nashua, N. H.; W. H. Carpenter, of Providence, R. I.; Thos. McDermott, of Biddeford, Me., and W. S. Foster, of Richford, Vt., executive committee.

ARCHIBALD HAMILTON MAXWELL.

The above is an excellent likeness of the late Archibald Hamilton Maxwell, one of Pennsylvania's old foundrymen, whose obituary was recorded in the January FOUNDRY.

The Pewabic Founders.

(By Telegraph.)

The regular monthly meeting of this association was held at the Grand Central Hotel, Pewabic, last Friday. Constant Humpon and Phineas Snort, both of East Squakit, were unanimously elected as members.

The meeting was presided over by the secretary, Asbestos B. Hellso, owing to the absence of the president, Pumice De Witt,

who had departed for Washington to interview the secretary of the navy in regard to having the government locate its armor plant at Pewabic. The secretary pointed out that Pewabic had great natural facilities for such an industry. By deepening the Pewabic river 30 feet for a length of 300 miles the largest vessel afloat could be anchored right alongside of the Whackdem Iron Works. One advantage possessed by Pewabic over all competitors was that in case our vessels should feel like retreating, the Pewabic river could be dammed to keep out the enemy. This was a protection afforded by no other proposed site, and as potatoes were cheap in Pewabic, it was argued that mechanics could afford to work for less money there than at any other place in the country.

Scrappy Pinocle said that he intended shortly to ask the congressman for the Paradise Flat district to introduce a bill appropriating a million dollars for experimenting with chilled cast iron armor-plates. He insisted it was a national disgrace, while every foundryman was trying to get work at $20 a ton, to allow the Carnegie and Bethlehem people $500 a ton just because they claimed to put a little nickel into their metal. At the price they got the speaker thought they could afford to use gold. Nobody had so far investigated the influence of gold upon cast iron, and he thought this would be a fit subject for the association to take up.

Jones De Fluor Spar, M. E., B. U. M., A. Malgam and Heab Mudtucker were appointed as a committee to determine the influence of gold upon cast iron, with instructions to prepare a report for some future meeting. It was suggested by the secretary that the committee should have sufficient interest in the advancement of scientific founding to furnish the gold needed for experiments at their own expense.

The executive committee, through its chairman, Flux McFadden, reported that the New Year held out great promises. The only serious drawback to a general resumption of business was the inclination of the Pewabic Founders to help themselves to free lunch without buying any beer. With the advent of spring it was hoped that the greatest number of plowshares in the vicinity would have been dissolved into oxides, necessitating the employment of new material. The Whackdem Iron Works had secured a lasting job which promised to keep them busy for two years. They had undertaken to burn a spout on a teakettle belonging to the widow Buzzsaw. Bodstick, Hardcase & Co. had secured patents on a cast iron horseshoe, which promised to revolutionize existing methods and furnish a ready outlet for the product of furnaces in the vicinity. The Billious Malleable Iron Co. were putting a malleable corset stay on the market, which had already secured the indorsement of all the preachers in Pewabic. We can see a great improvement over last year, though we cannot exactly say where it is. With the government placed on a sound basis there is no reason why our foundries should not be full of work.

Denny Beeswax read the paper of the evening, entitled

THE BEAUTY OF KEEPING COSTS.

"Most of you have experienced the joy of finding out at the end of the year that your work has cost more than you have got for it. In order to subdivide this pleasure the author has for some time had in use a monthly system of finding out what was unknown to him at the beginning of the month. Instead of keeping the office boy busy grinding the fins of castings he is made to do a few mental gymnastics, which have proven of great service to the boy.

"The different items are classified according to the letters of the alphabet. Thus A represents the relative cost of postage stamps to a pound of castings for the current month. It will be noticed that this item will fluctuate somewhat according to the number of firms who are looking for some one to underbid you on a job, but taken as a whole it bears an important part in the production of castings. B will represent the cost of insurance to a pound of castings. C the calculated depredation of plant to a pound of output. D is the salary allowed the scrubwoman for keeping the office clean. E the cost of claywash, and so on, down the list. In this way we know just the relative cost of every item entering the production and affecting the price of castings. Our system has been the means of saving our employes from losing considerable time. Whenever a man runs out of a job we do not lay him off, as is the usual practice, but put him to work figuring up costs. This gives him considerable experience upon which to base his calculations when he is

called upon to determine the amount of iron in a ladle. For this reason it is very seldom that we have a casting poured short. By simply extracting the cubic root of a cylindrical vessel of a given diameter the molder instantly knows whether his riser is of sufficient length to take off the strain. These calculations are also of considerable help to the molder on dark nights, as in case he collides with an obstruction in the gangway he immediately proceeds to determine the angle of the hypothenuse through which he must descend in order to gain his equilibrium."

The author illustrated the practical results of the system with some 700 different blanks included in a complete set. We understand the New York World is going to publish these in a special edition as an example of how Secretary Gage might solve the currency problem.

At the conclusion of the paper Dr. Salamander Pierce, C. I. M. D.,* took the floor and complimented the author upon his high skill in navigating through the labyrinth of figures absolutely necessary in conducting a cost system in foundry practice. The doctor characterized the paper as one of the most valuable additions that had been made to scientific founding in recent years. Foundrymen were beginning to realize, he said, that they must know how not to do a thing before they could hope to overcome the effect of shrinkholes.

Phineas Snort said that he had always insisted on knowing what a casting cost before charging for same. He thought that too many foundrymen were having their plants sold for taxes just because they considered themselves prophets enough to be able to say what a casting cost before they made it.

Hink Hokum testified that it was of the greatest benefit for the head of the concern to know what the cost per unit of output amounted to.

Secretary Hellso said he would like to ask Prof. Hokum what measures he adopted in case the cost was too high. If the head of a concern was a practical foundryman he could see wherein he could discern the items in which a reduction of cost might be effected, but where the head of the concern was only superfluously acquainted with foundry practice he failed to observe the method by which this individual would be able to form an opinion as to which items were high.

* Cast Iron Doctor of Medicine.

Prof. Hokum replied that in his establishment, whenever it appeared to him that costs were going upwards, he had made it a practice to give everybody h—— on general principles. He admitted that the head of a concern could only guess wherein costs were high, and after all would have to rely on his foreman and the efficiency of his men to reduce same. At the same time he contended that it was better to read the riot act to a hundred innocent men instead of letting one single cost-raising individual escape.

Scrappy Pinocle insisted that our foundries as at present constructed were ill adapted to the keeping of costs. He had contended for years that a radical departure was necessary, and only a lack of funds had prevented him from putting his plan into practice. A cost system to be perfect, the speaker said, should also be automatic. For this purpose the rear end of every molder's floor should consist of a blackboard, upon which the molder could record the relative cost of setting gaggers, putting on parting sand, etc. These items tabulated would serve as a valuable record through which coming generations would realize the difficulties which beset the founder in the latter part of the nineteenth century. If these blackboards were made of the right material, the fog which envelops a foundry at casting time would condense in their immediate vicinity and soften the figures which could thus be readily removed with the aid of a soft swab.

D. Oxite Bosphorus said every molder should graduate from a school of algebra and chemical equations. Some encouragement should be given to persons thus qualified who had aspirations to secure an introduction to a butt rammer.

Sublime Cannon thought that the question of cost had become a nuisance. So many men had been out of honest employment for several years, and from the number of so-called systems appearing in print it seemed as if everyone of these had devoted his time to getting up a cost system with necessary blanks for other people to fill out. There were two peculiarities about the general run of these systems. First, the figures given, pretending to show that the system was in a healthy working condition, were fictitious. If a cost system was such a howling success and made its owner wear diamonds, why were not actual opera-

tions shown instead of a lot of tommy-rot, consisting of 99 per cent of guesswork? In the second place, all of these systems cost practically nothing for motive power. The speaker knew that it cost quite a bit to even keep track of the number of hours or number of castings a man made, and if every minute had to be bisected into quondrum imaginary items he was satisfied this would cost more.

Wayback Gulliver said he was compelled to agree with the last speaker. It appeared to him as if every individual who had been unfortunate enough to inhale a small amount of core smoke, and who was possessed of a rather elastic conscience, had attempted to publish a cost guide. Personally he thought that all of these cost systems figured in too much invisible matter. Some time ago it appeared to him as if the cost in his foundry was higher than it should be. After spending a day in the foundry looking around instead of wasting paper in the office he had the following table at night:

16 molders going over to the machine shop five times a day to see what time it is, consuming five minutes in each trip	6 hrs 40 m
16 molders going over to the machine shop five times each to get a drink of water (better water in the M. S.)	6 hrs 40 m
16 molders cutting up sand heap on floor at 30 m	8 hrs
Hunting gaggers	4 hrs
Hunting bellows (two pair in the shop)	3 hrs 40 m
Mixing facing	6 hrs 40 m
Looking for flasks	5 hrs
Mixing claywash (compulsory and only done when necessary)	20 m
Time lost on account of slow-acting cranes (low estimate)	8 hrs
Time lost on account of melting in small cupola. Heat should have been taken off in one hour, time occupied two, lost time	16 hrs
Time lost looking for wood-screws (worth 15c each)	2 hrs
Total	67 hrs.

This made more than two-fifths of the molder's time added to the cost of castings, and yet in that time he produced nothing. Instead of splitting hairs in dividing the time a molder performed a certain operation! Mr. Gulliver thought it would be more sensible to figure up the time a molder was wasting owing to lack of facilities, and which might be turned to better advantage. The speaker had found that by providing a clock and decent drinking water for the foundry and procuring gaggers, bellows and other utensils, besides having laborers do the laborers' work, he had reduced his cost of output nearly forty per cent. If he had been content to merely figure out the relative cost of sour beer to output, he would only have had figures to show for his pains. The foundrymen, in this matter of keeping costs, he thought, were losing sight of the fact that a straight line is the shortest distance between two points.

On motion of Ferro Colishut the author was tendered a vote of thanks for his very valuable paper.

After adjournment the members repaired to the cafe, where a light collation of stewed tripe was served.

Obituary.

Burr Kellogg Field, vice-president of the Berlin Iron Bridge Co., died at his home in Berlin, Conn., January 15th, after an illness of less than a week. His death was so sudden and his sickness so short that few of his friends were aware that he was ill. Burr K. Field was born in May, 1856. He entered the Sheffield Scientific School of Yale University in 1874 and graduated in 1877 as a civil engineer. Immediately after graduation he commenced practical work among the railroads of the west. His principal experience was in connection with the laying out and building of the Northern Pacific. Mr. Field had charge of the locating and building of the branch connecting the Yellowstone National Park with the Northern Pacific. In 1882 he was appointed superintendent of bridges in the city of Philadelphia, which position he held for something over a year, when he resigned to accept a position as assistant engineer of the Berlin Iron Bridge Company, of East Berlin, Conn. His advancement in the Berlin Iron Bridge Company has been very rapid, and at the time of his death he occupied the position of vice-president, with general charge of all the sales. Since his connection with the Berlin Iron Bridge Company its business has been much extended and its sales have increased very rapidly year after year. Mr.

Field had no small part in the making of the enviable reputation which the Berlin Iron Bridge Company now enjoys, and his death will be a severe loss to his associates.

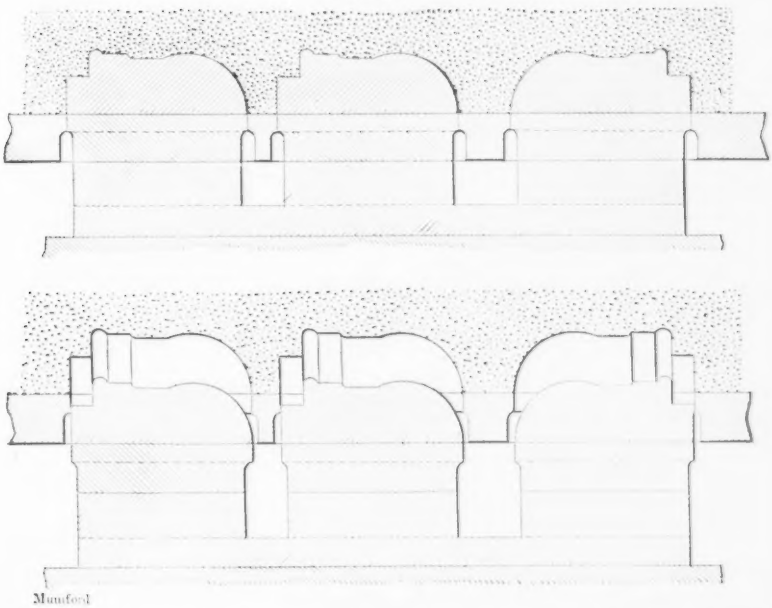
Machine Molding Without Stripping Plates.*

By E. H. MUMFORD.

Molding machines may be classed under three heads. First, machines which only ram the molds, and, when the ramming is done by means of a side lever, by hand, are generally called "squeezers." Second, machines which only draw the patterns, the ramming being accomplished by the usual hand methods. Third, machines which both ram the molds and draw the patterns, ramming either by a hand-pulled lever or by fluid pressure on piston or plunger and drawing the patterns through a plate called a "Stripping Plate" or "Drop Plate"—till recently the usual method—or, without the use of this plate fitting everywhere to pattern outline at the parting surface, the patterns being effectively machine guided in either case.

FIG. 1.

FIG. 2.



It is to the third class that the machine which is used to illustrate the subject of this paper belongs, and which would seem to have enough that is novel in the application of machinery to the foundry to merit the attention of the society.

*Paper read at the New York meeting (December, 1897), of the American Society of Mechanical Engineers.

At the risk of appearing pedantic, but with a view to developing an appreciation of the true function of the method of pattern-drawing used in this machine, attention is called to the following sectional views of molds and ways of drawing patterns occurring in machine molding. Fig. 1 shows an ordinary "gate" of fitting patterns being drawn from the drag or nowel part of the mold by means of a spike and rapper wielded by the molder's hand after cope and drag have been rammed together on a "squeezer" and cope has been removed. Frequently the pernicious "swab" is used to soak and so strengthen joint outlines of the sand before drawing patterns, in such cases as this. In this case, before cope is lifted, these patterns must be vigorously rapped through the cope; an amount depending (and so does the size of the casting) upon the mood and strength of the molder.

Fig. 2 shows the Stripping or Drop Plate method of drawing patterns.

In this method, the patterns are not rapped at all and are drawn in a practically straight line so that the mold is absolutely pattern size.

The stripping plate is fitted accurately to every outline at the joint surface of the patterns, obviously at considerable expense, and, of course, at the instant of drawing the patterns, supports the joint surface of the mold entirely. This is, at first sight, an ideal method of drawing patterns, and it has for years been the only method practised on machines. It has two disadvantages. The patterns are separated from the stripping plate by the necessary joint fissure between the two. Fine sand continually falls into this, and adhering to the joint surfaces more or less, grinds the fissure wider. This leads to a gradual reduction of size of patterns on vertical surfaces and a widening of the joint fissure often to such an extent that wire edges are formed on the mold, causing, on fine work, "crushing" and consequently dirty

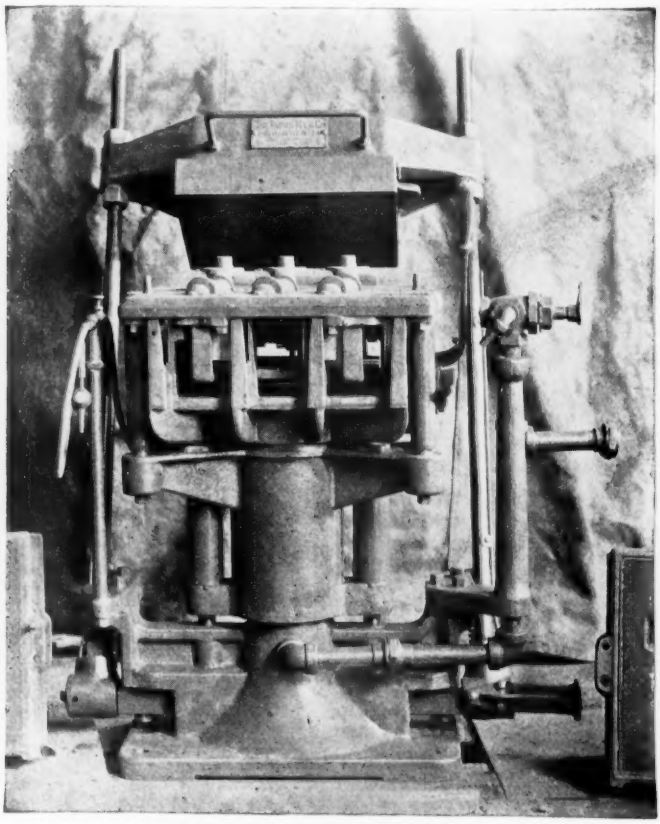


FIG. 3.

joints. A nicely fitted but worn plate of twenty-four pieces which had cost, at shop expense only, $250, was recently replaced by a plate of twenty-eight pieces, fitted ready for the machine under the new system about to be described, for not more than $25.

The Stripping Plate method has another drawback, not always appreciated, probably because accepted as inevitable. Stripping Plate patterns are not rapped, and there frequently occur on surface of patterns, remote from the action of the stripping plate, rectangular corners just as important to mold sharply as those at the parting line. Such corners have either to be filletted or "stooled" in stripping plate work, and neither method often is practicable. When the entire pattern and plate are vibrated so that the corners where the pattern joins the plate draw perfectly, as they do in the machine to be described, it is obvious that similar corners anywhere on pattern surface will draw equally well.

The vibrating of patterns, or rather of molds, during the operation of drawing the patterns possesses little of novelty. Ever since a bench molder's neighbor first rapped the bench while he lifted a cope or drew a pattern, the thing has been done in one way or other. In fact, machines are now and then found on the market in which a device like a ratchet or other mechanical means for jarring the machine structure during pattern-drawing renders the working of easy patterns without stripping plates possible.

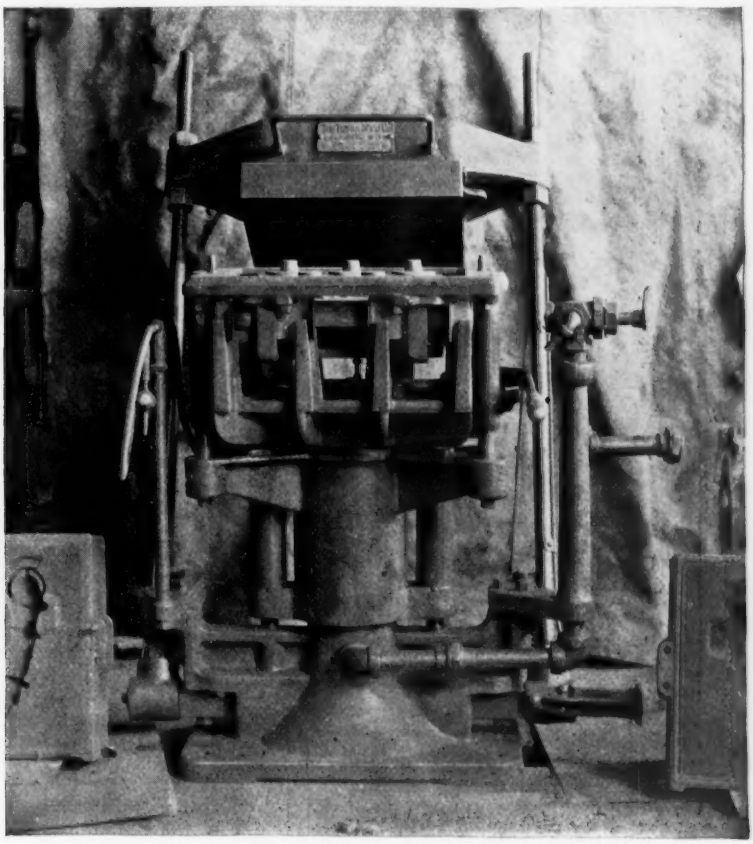


FIG. 4.

The idea of applying a power driven vibrator directly to the plate carrying the patterns to thus vibrate them independently of other parts of the machine and the flask and sand, has been the subject of the issue of patents to Mr. Harris Tabor and the following figures will serve to illustrate the mechanism. Figs. 3 and 4 show the general appearance of the machine from the side on which the operator stands. Fig. 3 shows the machine ready to receive the flask, the pat-

terns being up ready for molding. Fig. 4 shows the machine after patterns have been drawn and flask lifted.

Briefly, the operation of the machine is as follows: The ramming head shown thrown back at the top of the machine is drawn into a vertical position, after flask has been placed and filled with sand. The 3-way cock shown at the extreme right is then quickly opened, admitting compressed air of 70 to 80 pounds pressure to the inverted cylinder shown at the centre of the cut. The cylinder with the entire upper portion of the machine is thus driven forcibly up against the ramming head, flask, sand and all. Often a single blow suffices to ram the mold—often the blow is quickly repeated, according to the demands of the particular mold in hand. Gravity returns the machine to its original position, as the 3-way cock opens to exhaust. After pushing the ramming head back and cutting sprue, if the half mold is a cope, the operator seizes the lever shown just inside the 3-way cock at the right, and, drawing it forward and down, raises the outer frame of the top of machine containing the flask pins, with flask and sand thereon, away from the patterns—thus drawing them from the sand. Just as he seizes the pattern-drawing lever with his right hand, he presses with his left on the head of a compression valve shown at the left side of top of machine, thus admitting air to the pneumatic vibrator already referred to.

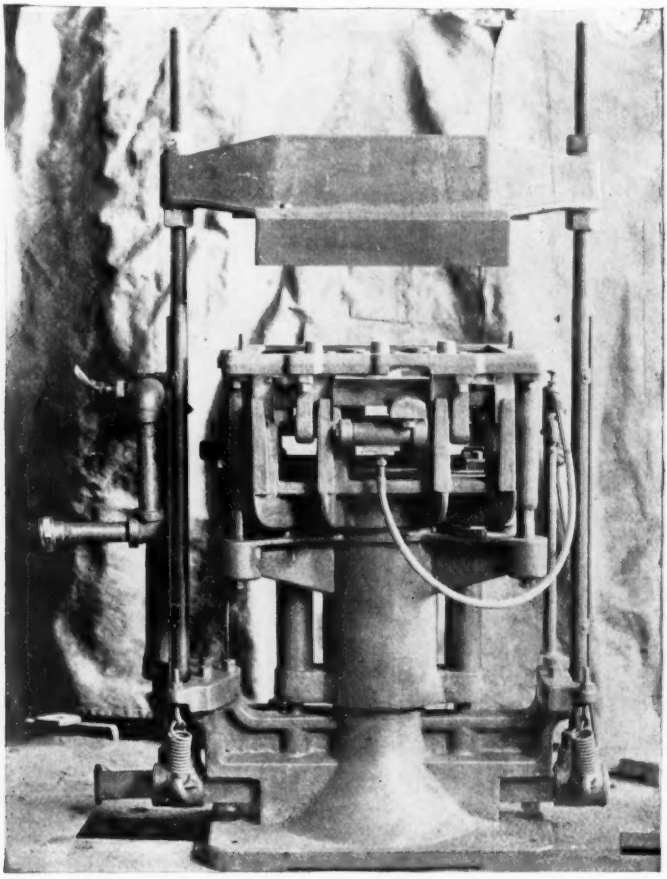


FIG. 5.

Fig. 5, a rear view of the machine, shows, at the top centre, with its inlet hose hanging to it, this vibrator which is shown in section in Fig. 6. It consists simply of a double-acting elongated piston having a stroke of about 5-16 inch in a valveless cylinder, and impacting upon hardened anvils at either end at the estimated rate of 5,000 blows per minute.

The method of communicating the rapid, yet small oscillations of the vibrator to the patterns and yet keeping them from being transmitted to the rest of the mechanism is this:

A frame, called a vibrator frame, to which the pneumatic vibrator is bolted and keyed is shown in Fig. 7. To this frame the plate carrying the patterns, often, in cases of patterns having irregular parting lines, forming one and the same casting with the patterns, is fastened by the four machine screws, the small tapped holes for which are shown in the corners. In fact, in changing patterns, the process consists of simply removing these four machine screws, taking up the pattern plate and screwing to the vibrator frame the new pattern plate. The vibrator frame itself is secured to the machine structure by the four larger bolts, the holes for which are shown in the inner corners. These bolts are, as shown in Fig. 9, surrounded by thick bushings. These bushings are elastic to such a degree as to absorb the sharp vibrations of vibrator frame and patterns, while so firm and well-fitted as to hold patterns accurately to their position.

FIG. 6.

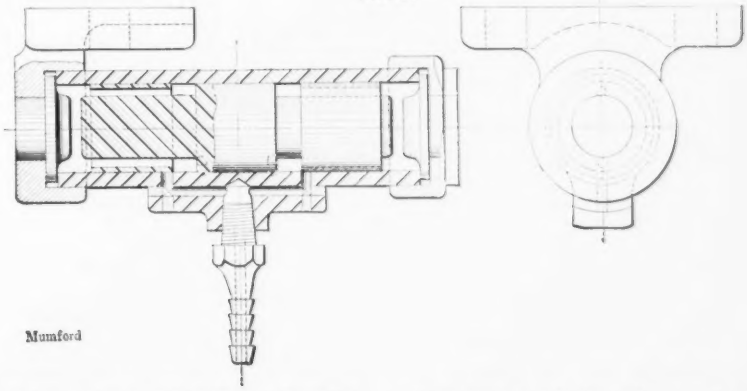
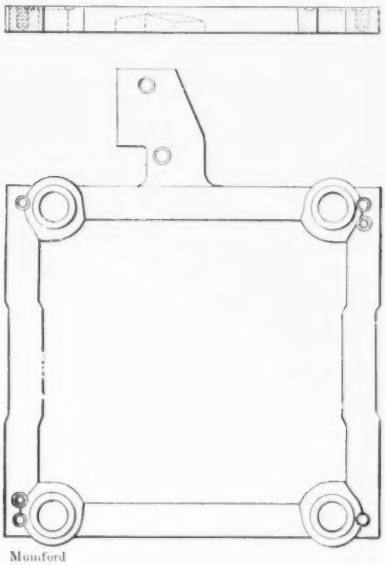


FIG. 7.



The action of the vibrator is such as to give to the entire pattern surface an exceedingly violent shiver, making it impossible that any sand should adhere to this surface, while the magnitude of the actual movement of the pattern is so slight that it is found to fill the mold so completely that it is impracticable to draw it a second time without rapping. Yet, so truly are the patterns held, and so little disturbed from their original position, that it is perfectly practicable to return patterns to a mold having the finest ornamental surface in the ordinary practice of "printing back."

In cases where deep pockets of hanging sand occur, which cannot be held during lifting off and rolling over, machines are arranged to roll the flask over in their operation and draw the patterns up under the influence of the pneumatic vibrator, though, owing to the time consumed in the rolling over process (and each operation counts in seconds on a molding machine) this style of machine is not usually as rapid in its working as the simpler type, in which the flasks come off in the same way they go on.

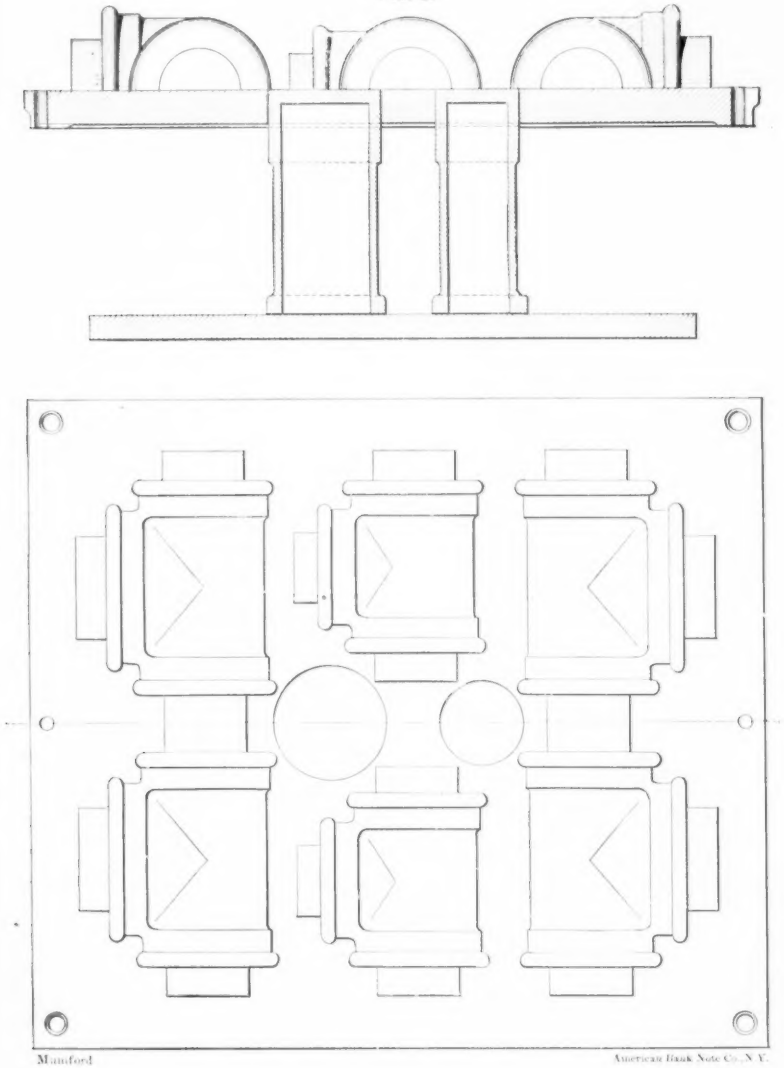
Fig. 8 shows a set of patterns as they are ordinarily fitted to plates for this machine. Round holes will be noticed at places in the plate surface. These are openings for the insertion of what are called "stools."

When it is found necessary to support the sand surface at any point, or generally, round holes are drilled through either plate or pattern surface and loose cylindrical pieces are dropped into these holes, their upper end surfaces being flushed with the plate or pattern surface and their lower ends rest-

until same is lifted from machine. Fig. 9, showing a vertical section through a machine, will make perfectly clear the position and action of these stools.

As illustrating the importance of being able to work without stripping plates on a line of work which is much more extended

FIG. 8.



Mumford American Bank Note Co., N.Y.

ing on the plate called, from this use, a stool plate. This plate appears in Fig. 9 at A and is hung solidly by the brackets shown at B from the frame which carries the flasks, so that it has the same upward motion as the flasks, and the upper ends of the stools remain in contact with the sand of the mold

than that possible with them, we may say that a machinist with a drill press, supplied with split patterns and planed pattern plates has matched and fixed five sets of from four to eight pieces in a day; and wooden patterns fitted for temporary use in the same way, are of frequent occurrence when it is not

thought wise to go to the expense of metal patterns on account of the relatively small number of castings to be made from them.

It is not, perhaps, too much to say that pattern expense is not the final evil of the costly and not durable stripping plate patterns.

Western Foundrymen's Association.

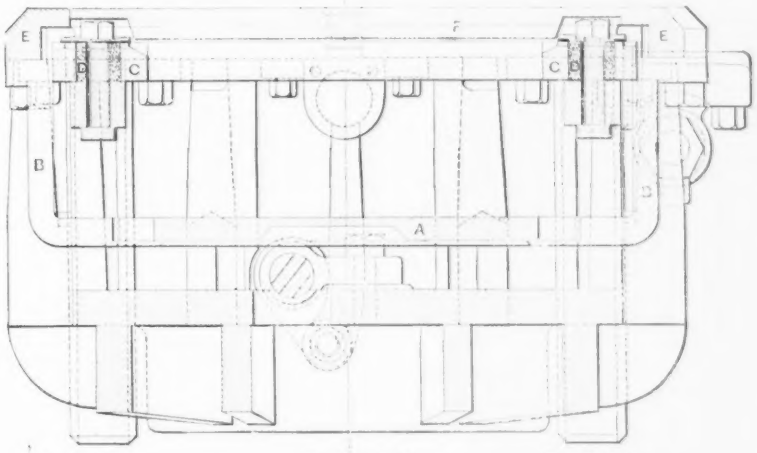
At the January meeting of this association, Malcolm McDowell presented a paper dealing with the "Value of the Metalloids in Cast Iron."

The author describes a number of experiments made by him to show the value of knowing the constituent elements of iron. The following extracts are taken from the paper:

alone will not make a good casting. It requires a proportionate amount of manganese to insure castings that are strong, solid and free from sponginess. A foundryman should keep on hand at least one car load of 10 per cent ferro-silicon and one ton of 80 per cent ferro-manganese. Equipped with these two and a coke that will run less than .75 per cent sulphur, he can meet any requirements in castings, even if he has nothing but common cast scrap iron to work with or an off pig, provided he has an intelligent knowledge of the use of these two metalloids.

"When all other things are equal in pig iron, the variation in silicon will be manifest in the fracture, provided it is made and cast at the same temperature. Each of the

FIG. 9.



A Stool Plate
B Stool Plate Brackets
C Vibrator Frame
D Elastic Bushings
E Flask Frame
F Pattern Plate

Mumford

MACHINE MOLDING WITHOUT STRIPPING PLATES.

"It is estimated that each atom of sulphur neutralizes ten of silicon. When pig iron carries three or more per cent silicon, it is called a "softener"; when it goes between three and five per cent, it has various names, such as 'silvery'; and after it goes above five per cent, and from that to ten, it is called 'ferro-silicon.' This carries less sulphur in proportion to its silicon than any other form of pig metal, and as a softener is a question of silicon, 10 per cent 'ferro-silicon' is the cheapest softener that can be bought.

"While pig iron, softener and ferro-silicon prices are all measured by the amount of silicon the metal carries, high silicon iron three metalloids, phosphorus, sulphur and manganese, varying in their proportions, also affect the nature of the fracture, as do also the different degrees of temperature at which the metal may be cast, and the condition of the atmosphere at the time of casting.. These are the causes that make it impossible to make a uniform gradation of pig iron by fracture.

"All blast furnaces making metal for steel works meet the requirements of the steel maker by furnishing a metal having a specific analysis, while a few exceptional blast furnaces making a foundry metal, grade their output by fracture. They do not care to employ a chemist to grade it

systematically according to its constituent elements by analysis. There are a great many foundries that employ to a greater or less extent a chemist to analyze the pig iron they buy and castings they make, and in buying metal graded by the furnacemen according to fracture, they have been enabled by the use of chemistry, to duplicate their orders very much to their profit and the furnacemen's loss. In justice to both furnace and foundryman, pig iron should be bought and sold by analysis."

After discussing some of the points brought out by the paper, a motion was adopted to take it up at the next meeting of the association.

CAST IRON NOTES.

Devoted to Inquiries from Practical Foundrymen on the subject of Melting and using Cast Iron. Address all Inquiries to W. J. KEEP, care of The Foundry.

ALUMINUM IN PULLEY CASTINGS.

"One of our main branches is pulley castings and we have considerable trouble in obtaining a proper mixture that will make a strong, and at the same time a soft, casting, particularly in pulleys having rims of light weight. Our mixture is Southern No. 1 soft, Ohio foundry iron, and machinery scrap. Our pulley castings vary in weight from 10 to 10,000 pounds each, the majority being less than 100 pounds. We would like your views as to the best mixture of iron for pulley castings. We have been experimenting with aluminum for some time, but cannot see that we have derived any benefit from its use. Will you kindly tell us whether its use should be of benefit in such castings as ours and in what way aluminum will act on a mixture?"

If the cast iron which you use contains a large proportion of combined carbon the addition of aluminum will change a part of it into graphite. The adding of a small portion of aluminum will have very little effect. The fact that adding aluminum to iron which tends to be white, will make it gray, and will take out brittleness, does not prove that it would be desirable to use it in ordinary foundry mixtures. Silicon added to cast iron exerts exactly the same influence as adding aluminum, only a greater quantity is required. Aluminum is expensive, and there are practical difficulties attending its introduction which makes its use impracticable. Silicon can be purchased in pig iron without materially adding to the cost and there is no difficulty in adding the necessary amount to the iron mixture. The addition of either to a mixture which is already gray and soft enough cannot improve the casting, and will very likely make the grain too open and therefore weak.

The shrinkage of all parts of a casting should be as nearly as possible the same, which can only occur when all parts of all castings poured from that iron are of the same size. It is usually conceded that it should be as nearly as possible to one-eighth of an inch per foot.

To make a large casting shrink one-eighth of an inch per foot it must contain less silicon than if the casting was small. This makes it a difficult matter to produce a uniform shrinkage in a pulley which has more iron in one part than in another.

The iron in any one casting must contain the same silicon whether in the heavy or the light parts, therefore the thin parts will shrink more than the heavier portions, causing unequal strains.

When such unequal proportion cannot be avoided iron that will shrink least will be most likely to produce a casting which will not crack and which will have the smoothest surface. Generally speaking any pig iron that will produce a casting with the most desirable percentage of silicon is not only the cheapest, but the best; although it is a fact that certain brands of pig iron will produce exceptionally strong castings, while other irons which have the same chemical composition will not produce as strong castings.

The fact that aluminum changes combined carbon to graphite and acts in the same manner as silicon, was first discovered in 1888. (Trans. A. I. M. E., Vol. XVIII., pp. 102, 799, 835). Mr. R. A. Hadfield has recorded experiments proving the same thing, and Mr. T. W. Hogg at the Brussels meeting of the Iron and Steel Institute, 1894, gave full analysis of a large number of castings cast in sand and in chills. Founders and experimenters in this country have from time to time given results of adding aluminum to cast iron and without exception sustained the results of previous experiments. But while these facts are fully proved, yet the practical way to regulate the color, softness and strength of a casting is to vary the silicon.

When a great variety of sizes of castings are to be made in one day it would be well to vary the silicon in different cupola charges, so that the iron poured into large castings would contain less silicon than that poured into small castings.

BEST IRON FOR STOVE PLATE.

One correspondent wishes to know the best mixture for stove-plate castings. This depends upon the location of the foundry. The mixture must be made of irons which can be purchased in that locality at a reasonable price.

Castings which contain from 2.75 to 3.50 per cent of silicon are less liable to crack by the sudden changes of temperature to which they are subjected. They are also soft. The only question is how to get silicon into the casting. The pig iron must contain the right amount or else silvery iron must be used.

In Troy and Albany before the influence of silicon was understood it was thought that the best pig iron for stove-plate was made from soft hematite ores which were not too rich in iron, and it will be found that the pig irons most used at present are those made from red hematite ore, though there are some brown hematites that will make a non-chilling iron. Most of the southern foundry iron is made from red hematite.

The same letter asks for the chemical analysis of good stove-plate.

It will be carbon about 3.25, about 0.30 of which will be combined; silicon from 2.75 to 3.25, phosphorus about 1 per cent, sulphur about .06, though 0.10 will do no harm. The constant remelting of sprues will often raise sulphur to this last per cent. Manganese will be about 0.5. This iron would be fluid and soft and will make smooth castings.

FLUXES USED IN MELTING.

"What has been your experience with fluxes, such as limestone, fluor spar, etc.?

Limestone seems fully as good as fluor spar and is much cheaper. I think when thin castings with large surfaces are to be made the surface will be better with limestone. It is the lime in the stone that is desirable. The silica and magnesia are undesirable. The stone that contains most lime is the out-crop, which has long been exposed to the weather. Stone taken out of the same quarry at considerable depth will often contain as much magnesia as lime. The chips from a stone yard are of this nature and are not the best for fluxing. Oyster shells or marble chips would be good. The only good a flux can do is to make a fluid slag in the cupola through which the drops of melted iron can sink and be protected from the blast. Where the whole iron melted does not fill the cupola more than 10 or 12 feet above the bed there is no need of using flux unless a little is thrown in with the last charge to make a cleaner drop and to make it easier to break up the dump.

If a large quantity of iron is melted in one cupola the slag must be drawn off so as not to clog the cupola. Flux is used to make it fluid enough to come out of the slag hole. By making the hole of the right size the slag will run continuously without much air escaping. The least possible daubing should be used in repairing the cupola, just enough to hold the necessary pieces of fire brick in place. The daubing is composed of fire clay and sharp sand, both of which when combined with lime form a fluid slag. The more daubing the more slag.

A Portable Pneumatic Rammer.

The introduction of compressed air has offered the foundry, in common with other industries, a chance to have much of its drudgery performed by mechanical means. From time to time we have illustrated new applications along this line, and in this issue we show a portable rammer in use at the foundry of the Wm. Cramp & Sons Ship and Engine Building Co., or as it is popularly known, the I. P. Morris Foundry.

This rammer is the invention of Mr. Joseph Cramp, to whom patents have been granted. So far the principal use to which it has been put has been in the ramming up of pits for loam molds, where it readily performs the work of a dozen laborers, besides doing the work in a better manner, ramming the sand harder and more evenly. The rammer, which requires but one man to operate it, is swung on a light crane, supported on the columns or wall of the foundry. This crane as constructed can readily be moved to any part of the foundry, where it is desired to utilize the rammer, or the latter may be attached to a common crane. Besides its utility in ramming up the pits around the loam molds, it has become almost indispensable in ramming up large green or dry sand molds or work bedded in the floor, where a large amount of muscle is usually required.

In foundries doing heavy work in the floor it becomes necessary to ram up the hole solid after the casting has been removed, in order to insure against soft spots, when another casting is to be made. In ramming up pits of this kind the pneumatic rammer will easily do the work of twenty men, and perform its work in such a manner that there will be no danger of soft banks when another pit is dug.

PORTABLE PNEUMATIC RAMMER.

Several practical foundrymen who have seen the rammer in operation have expressed the opinion that it is applicable in ramming up green sand work where a considerable number of molds are required off one pattern, such as bath tubs, etc. Its construction is so simple that it does not require an experienced hand to run it, as there is nothing to get out of order. All the attention it needs is to be kept packed in working parts such as valve stems and stuffing boxes.

The valve for operating the rammer is of the Corliss or rotary design, and retains a perfect steam or air-tight seat under all conditions. Its movement is so regulated as to secure the greatest amount of working power from the steam or air used. Its arrangement of having the valve separate from the cylinder results in an absolutely tight valve, never leaking, always positive, controlling the piston positively and enabling the rammer to run at any pressure without the difficulty usually arising from the presence of wet steam or air.

The travel of the rammer is four and one-half inches, and the number of blows is 160 per minute at 60 pounds pressure, when the blow is 320 pounds. All parts of the rammer are made to gauges and templates, which insures the fit of duplicate parts.

The construction of the rammer is two cylinders, one above the other, with a piston rod running through both cylinders; the ram or rammer is attached to the piston rod with the cut-off valve between the two cylinders; in this way there is claimed to be the least loss of power.

Suggestions for Foundry Construction.

Editor of THE FOUNDRY:

In reply to B. & S. in your January issue, I would state, after years of experience with different makes of cranes, I think the Ridgway crane of Coatesville, Pa., is the nearest perfection. (I am not connected with Ridgway's in any manner.) Some five years ago we purchased one of ten tons capacity and have never regretted it. We can hoist so slow when drawing a pattern that you cannot see it move without watching very close, or can hoist in twenty seconds the distance of sixteen feet. We move the blocks on crane by simply pushing work out or in as desired, and in pouring a five-ton ladle two men to steady and one to pour, move it in or out, without any trouble.

The jib of this crane raises and lowers parallel. We had a casting of nine tons to make and had to use two five-ton ladles. We raised one on the hook and the other

on a chain around the jib, thus pouring two ladles on the one crane and only one set of blocks and did it handily. So much for cranes.

The only suggestions I can make are: Keep your cupola as near the center of your plant as possible, in fact right in the center of the foundry. Have more than one core oven, small one for drying small cores quickly, so as not to open large oven every few minutes, as is frequently done in some of our well-equipped foundries. Build your core rooms independent of foundry so your cores go in one end of oven and come out of other in the foundry ready to set. Have your cleaning department away from foundry and connected with foundry by railroad tracks so that castings can be loaded from cranes and run out of foundry. In other words, keep the foundry for molding and no other purpose. And make your foundry light, plenty of windows on side and a big lantern on roof, so that it can be thrown open when casting and draw away the steam that no light will shine through.

J. H. BLANKLEY.

Twenty-first and Somerset sts., Philadelphia.

Among the Foundries.

The Pen Argyl (Pa.) Iron Works was burned recently.

William Steckroth has started a foundry at Hazleton, Pa.

S. W. Fox, of Alverton, Pa., will erect a foundry at that place.

The Columbia Iron & Brass Foundry at Philadelphia burned Dec. 27.

The foundry of the Keller Mfg. Co. at Sauk Center, Minn., burned Jan. 6.

The Lizzie Lowman Stove Works at Sheffield, Ala., is nearing completion.

N. F. Thompson is contemplating the removal of his foundry from Orange, N. Y.

By the bursting of a dam at Norway, Ont., the foundry of William Neild was swept away.

The brass foundry of M. M. McCaul, at 289 South street, Boston, was badly damaged by a recent fire.

Kinch, Davis & Co., of Butler, Pa., are reported as intending to establish a foundry at Kittanning, Pa.

The Enterprise Foundry Company has been incorporated at San Francisco, Cal., with a capital stock of $25,000.

R. S. Woodruff has purchased the foundry at Amesbury, Mass., hitherto operated by the Atwood Manufacturing Co.

The Durango Iron Works, Durango, Colo., is reported to have been destroyed by fire. Loss, $30,000. Insurance, $7,000.

The Driggs-Seabury Co. of Birmingham, Ct., are reported as intending to establish a foundry in addition to their works.

J. W. Penney & Sons, of Mechanic Falls, Me., have become incorporated with a capital of $100,000 under the name of J. W. Penney & Sons' Co.

The Laconia (N. H.) Car Co. will make extensive improvements in its foundry plant, adopting the latest approved practice in handling both metal and castings.

The Wichita Stove & Iron Works, of Wichita, Kan., after a heavy trade during '97 are increasing the capacity of their plant by about 35 per cent in view of the promising outlook for '98.

The Dayton (O.) Furnace & Foundry Co. has filed the necessary papers with the secretary of state to change its name to the Progressive Furnace & Foundry Co. and its place of doing business to Springfield, O.

A small portion of the plant belonging to B. F. Avery & Sons, of Louisville, Ky., was damaged by fire Jan. 13. No delay occurred in operations, however, as the fire was confined to the polishing department alone.

The stockholders of the Sulzer-Vogt Machine Co., at Louisville, Ky., at a recent meeting decided to change the name of the corporation to the Henry Vogt Machine Co. There will be no change of officers and the management of the company remains as heretofore.

The Brooklyn Fire Brick Works, of Brooklyn, N. Y., have issued a catalogue, illustrating the large variety of fire clay material made by them. Its description of the various styles of fire brick for cupolas and brass furnaces makes it a handy reference for ordering these materials.

The Pennsylvania Car Wheel Co., with a capital stock of $100,000, has been organized at Pittsburg, Pa., with Joshua W. Rhodes as president; W. L. Elkins, vice-president; C. V. Slocum, secretary and treasurer, and A. W. Slocum superintendent. The two latter gentlemen were formerly connected with the New York Car Wheel Works at Buffalo, N. Y.

The Exeter Machine Co., Littleton, Pa., is erecting a new foundry, the dimensions of which are 75x90 feet. The structure is being built of brick with iron roof, and is to be modern in all its details. It will be equipped with a power traveling crane (probably electric) having a span of 40 feet, running the full length of the shop, which will be illuminated by electric arc lights and be ready for occupancy about March 1.

The Whitaker foundry at Kenosha, Wis., has been purchased by Peter Lippert, of Chicago, who will take possession of the plant at once and continue the business as heretofore. The Whitaker plant is one of the oldest manufacturing plants in the city, and has been in existence for nearly fifty years under the direction of R. B. Whitaker. It is said that the present capacity will be greatly increased under the new management.

Malleable Iron.

By W. H. KREMER.

This important article of commerce, of which but little has been written, has, in fact, almost kept stride, in its adoption, in taking the place of grey iron castings with Bessemer steel in its relation to wrought iron.

It has not been many years ago when, with the exception of chains and a few minor light castings, this metal was not used by agricultural implement makers who are now employing this material exclusively for castings on many of their tools. Its uses at that time were limited to cheap harness and buggy work, keys, small household tools and light hardware.

A well-grounded prejudice existed against castings in malleable iron of such dimensions as are now successfully made every day, and with the exception perhaps of a half dozen concerns, it was almost impossible to secure a reliable casting of twenty pounds in weight.

Cupolas were largely used for smelting the iron. The latter in nearly all cases was iron from the "Salisbury" district. Later plants were erected in the west, also employing cupolas, which used Lake Superior, "Salisbury" and Baltimore irons.

The knowledge in the making of this iron was not as general as it should have been, and many factories depended upon Salisbury pig as their only hope. When satisfactory results were not obtained from their mixtures more Salisbury was used, and it generally accomplished the purpose. A great and deserved faith was put in this iron as it was about the only iron on the market at the time which could be used exclusively in the mixture.

The "Natural Draft Air Furnace" could use up only a portion of sprues made, hence the extra sprues were melted in a cupola and cast into the lighter work. Although the sprues bring a refined iron when put into the cupola, the castings after annealing, were much inferior in malleability to those cast from the air furnace owing to the absorption of detrimental elements during its fusion.

Sometimes when the furnace would be working poorly and "rush" orders be piled up on file, it would be found "expedient" to cast other than "light work" from the cupola. This practice did a great deal to form the prejudice mentioned before, for in nearly every instance some "kick" would be made about some casting or other breaking, while the balance would probably escape the strain given the broken one and pass on to the final consumer, from whom the malleable iron men never heard.

The introduction of the forced draft air furnace enabled the melting of all the sprues made in the shop. Foundries supplied with this furnace did not have to resort to a cupola, with the exception of those plants having very light work.

With the use of this furnace a more reliable and uniform iron has been made, not only to the satisfaction of producers, but to consumers in general. It has, and is being adapted to almost every conceivable purpose where a strong and malleable metal is desired. The confidence in its reliability is shown by its use in saddlery hardware and by wagon and carriage builders, who may be liable to an action at law for damages resulting from a broken bit, tug, etc.

Agricultural implement makers have vied with each other in producing as light and strong a tool as could be made to suit the requirements, and have found in malleable iron just what they wanted in the form of castings. This can be proven at any time by examination of some of the latest tools on the market. They consist chiefly of malleable iron, soft steel, bolts and rivets.

Railway car builders have also recognized the merits of malleable iron, and it forms the great feature which enables them to build a 6000 lb. car weighing approximately near the

old style 10-ton car, in the construction of which only grey iron castings were used, thus saving the hauling of many tons of dead freight by the railroads. The latter, in many cases, have adopted the metal for use in their locomotives as cylinder heads, driving bars, steam connections and for many articles formerly made of brass, obtaining better results than is had from ordinary cast iron, with little or no greater expense, owing that when a pattern for grey iron castings is to be changed to one for a malleable one the weight, where practical, is cut down to a limit of safety. Ribs and flanges being substituted to attain the proper rigidity of the castings.

No doubt but that the industry of making malleable iron castings has passed its infancy, but it is still very young and in its youth. Notwithstanding the large capacities and number of plants in this country, capacities ranging from 1,000 to 30,000 tons output of castings per year, with eighty odd plants running full blast, the supply is not up to the demand, and orders are refused by many plants.

The trade was dull for several years previous to the opening of this season (July, 1897), and prices prevailed for good sized contract work which only the larger factories could meet with any profit. In consequence, they are filled up with low-priced orders, while the unsuccessful bidders seem to be the best off, since they have more orders than they can fill at much better figures than prevailed at the opening of the season. Predictions are made that malleable iron will sell from $5.00 to $20.00 per ton higher by the beginning of next season, and with the continuation of anything like the present demand there seems to be no reason why the prediction should not be verified..

The enormous requirements of the railroad companies in the next two years to enable them to comply with the inter-state commerce commission law regarding safety appliances will stimulate trade to a great extent. Many of said appliances are wholly or partly made of malleable iron.

Some years ago steel casting was viewed with some alarm by many concerns, thinking perhaps that it would be brought to such a perfection as to displace malleable iron, but after years of trial the latter still holds its place, and more, it is liable to do so. The cost of molding for steel casting will prevent its coming in competition with malleable iron, excepting in very large castings.

The farmer, whose welfare we look to as an indicator of our prosperity, gives abundant signs that his accounts balance on the right side, and the demand he will make for farm implements will keep our shops running to supply his wants. The outlook in this trade never looked brighter and we may look forward to increased capacities to accommodate the demands. May it be so.

The subject of the iron in question is a fascinating study, providing one goes to the bottom for facts. As this business is carried on it appears on the surface as a very ordinary affair. Men do this or do that without anyone seemingly advising them, but some master mind has trained them for causes known to them, to do just as they are doing. Reliable men are given positions requiring such help, and when orders are obeyed the result is certain.

Malleable iron is made from both charcoal and coke pig. Charcoal pig was formerly used exclusively, but for several years past coke iron has come into use very extensively. The mixtures are made to formulas by the use of which the desired result will be obtained in the finished product. It requires good judgment and practical knowledge to make up the formula. The elements of the iron in hand are not alone to be considered, for the coal used, blast, and the shape that the furnace is in are also factors to be counted on.

The elements which are considered most important in the mixture of iron for malleables are the carbons, silicon, manganese, phosphorus and sulphur.

The conversion of graphite carbon into so-called combined carbon and the elimination of silicon during the fusion of the iron and its subsequent heating, are points to be watched with care, and it is often desirable that means are at hand by which the percentage of each can be determined so that any error can be corrected in the next heat. A small laboratory will save its expense several times over during the course of a year, and some plants are equipped with quite elaborate affairs, having the service of a chemist to conduct the determinations. The time is near at hand when a laboratory will be as necessary an adjunct to a foundry as a core oven is now.

More intelligence is brought into foundry practice every day, the "rule of thumb" is shelved. The results obtained by intelligent investigators are eagerly looked for and taken advantage of whenever possible to better the product, and it is very probable that

in the near future we shall produce an iron equal to "steel" in all respects, and better in others.

National Founders' Association.

Our readers will remember that at the Detroit convention of the American Foundrymen's Association a committee was appointed to prepare plans for the organization of an association on protective lines similar to the Stove Founders' Defensive Association. Just as the last forms are going to press, the information reaches us that the National Founders' Association was formed in New York City on January 26th with the following officers: President, W. H. Pfahler, Abram Cox Stove Co., Philadelphia; Vice-President, C. L. Newcomb, Deane Steam Pump Co., Holyoke, Mass.; Treasurer, W. H. Wells, Holly Mufg. Co., Lockport, N. Y.; Secretary, John A. Penton, Detroit. A large number of foundrymen from all parts of the country were present.

Our industrial development seems to favor and demand organization as a measure of protection. Just as the enormous armies of Europe are said to be a guarantee of peace, so it is claimed that mobilization of industrial forces exert the same influence. It can not be gainsaid, that mere trifles have often caused great loss to employer and employe alike and if the National Founders' Association can promote the settlement of differences by reason instead of might, by careful consideration of each other's condition instead of arbitrary actions, its organization will mark a new era for American founders.

Of course, an organization of this kind wields an enormous power, and its actions will be approved only so long as that power is used wisely and with justice. It should not be forgotten that employers are as often the authors of unjust demands as are the employes. It is a common occurrence for foundries to reduce wages, in order to underbid each other, and we believe the National Founders' Association will find it necessary to bring some sort of pressure to bear upon concerns trying to secure advantage by such means. In fact, the object of this society is twofold, and we believe this is realized by its promoters. It is as much its duty to prevent undue demands upon the part of the foundryman as upon the part of the molders or other employes. Let the National Founders' Association decide questions which come before it, on their merit, and it will not only have a large membership, but the unqualified approval of all engaged in the trade, no matter how lowly their position may be.

Technical Journalism—Past and Present.

In a recent address to the Rensselaer Polytechnic Institute, Troy, N. Y., Colonel Henry G. Prout, editor of the Railroad Gazette, spoke so truly and sensibly of the conditions of editing a technical journal that we give his concluding words:—"The fortune of the editor of the engineering paper is that he is working for a select audience. He is working for an audience that demands of him, first, that he shall tell the truth above all things; an audience which demands a certain discretion and modesty of opinion; an audience which has discovered that wisdom does not fall like a mantle upon him and clothe him the moment he sits down in an editorial chair; and the sooner the editor discovers this the better for his business. The editor of the engineering paper very soon finds that he cannot establish a wisdom trust, and that the first thing expected of him is to speak the truth; and that he is expected not only to be truthful in intent, but to carry it into effect; and these, gentlemen, appear to me to be the great reasons why you are getting a better class of technical literature to-day than you had ten years ago—the great reasons why technical journalism stands to-day on an honored foundation, and the great reasons why we may hope that the engineering press will go on in the years to come steadily for the profit and glory of the engineering profession."

Sparks.

It hurts some people's feelings to be told how they can do better.

A quiet apprentice does not always make the smartest journeyman.

Most of us would be sick half of the time if we tried to swallow our own advice.

The man who howls about a lack of good molders, as a rule, wouldn't hire a good mechanic if he could get him.

The wind turned into a cupola is not necessarily superior to the rest of the atmosphere, because it passes through a certain kind of a blower.

NOTICE!

Advertisements in this column, 30 cents a line for each insertion. About seven words make a line. The Cash and Copy should be sent to reach us not later than the 20th to insure publication.

Answers addressed to our care will be forwarded.

TO SUBSCRIBERS

whose names appear on our **subscription** list, we will give one free insertion under this heading to those in want of positions, the advertisement to occupy a space of not more than five lines. Additional space or insertions must be paid for in advance at regular rates.

FOR SALE—First class cupola and six-ton foundry jib crane. Pawling & Harnischfeger, Milwaukee, Wis.

FOR SALE—Two No. 3 Wells lights in perfect working order. Oriskany Malleable Iron Co., Oriskany, N. Y.

WANTED—Position as foreman, twenty years' experience on light and heavy machinery and jobbing work. Address "Columns," Box 71, Care THE FOUNDRY.

WANTED—Position in malleable iron works by a superintendent who has had more than thirty years' experience. References furnished. Address box 81, care of THE FOUNDRY.

WANTED—A sober, experienced man to take charge of small foundry in California. Light and heavy mining machinery. Give age, references and wages. Address "California," box 109, care THE FOUNDRY.

FOR SALE.—ONE N. S Root's Blower in perfect condition. Cheap. One each Baker Blowers, No. 3, 4, 7 and 7½, second-hand. Also, several second-hand cupolas. Address, J. W. PAXSON CO., Philadelphia, Pa.

WANTED SITUATION—Position as foreman in foundry and machine shop; understands mixing and melting iron; am steady and sober. Can give good reference. Address "Reliable," Box 108, care of THE FOUNDRY.

BARGAINS IN BLOWERS—We have on hand three No. 6 second-hand blowers, taken in trade for larger machines; thoroughly overhauled and guaranteed as good as when new. P. H. & F. M. ROOTS CO., Connersville, Ind.

WANTED—Situation as foreman of iron foundry; 20 years' experience; steam and hot-water boilers and general jobbing. Expert on molding machines and core work. Address "Boiler," box 107, care THE FOUNDRY.

AN A1 FOUNDRY FOREMAN desires to make a change. Competent to conduct any part of the foundry business. Best of references. Only those wanting a first-class man should apply to "Machinery," Box 27, care THE FOUNDRY.

FOR SALE—A small foundry with established and profitable business; one-half interst or the whole at the rate of $5,000 for the whole. An excellent chance for an office man. CRAWFORD & CONOVER, Seattle, Washington.

WANTED—A situation as brass foundry foreman. Have had twelve years' experience on both light and heavy castings and can come well recommended as to my ability in mixing metals and handling men. Address "Brass," Box 97, care THE FOUNDRY.

WANTED—Position as chemist and metallurgist. Technical graduate, molder by trade, and thoroughly up to date in modern methods of analysis, mixing and general foundry practice. Good references. Address "Chemist," box 111, care THE FOUNDRY.

AN EASTERN UNIVERSITY, whose engineering course includes foundry work, desires the services of some skilled young man, well acquainted with cupola practice. A rare opportunity to obtain an education. Address, with references, "University," care of THE FOUNDRY.

FOR SALE, in Northern Texas—Foundry and machine shop with increasing trade. Well located, 30 miles from competition. Doing good business in repair and contract work. Have one contract for castings of from 6,000 to 20,000 lbs. per month. Address "Texas," box 110, care THE FOUNDRY.

A GENTLEMAN well known to the foundry trade will be at liberty shortly to accept a position as manager or superintendent of a foundry plant. Is a practical mechanic in all that pertains to foundry practice, both in iron and brass, chilled rolls, car wheels, etc., and capable of handling a large number of men with best results; is a thorough business man in buying, selling, making estimates and contracts. For a number of years past has been manager and conducted the en-

tire business of a large foundry plant, and has an extensive acquaintance with railroad officials throughout the west and south; highest references furnished. Address box 93, care THE FOUNDRY.

By Way of Advertising.

Francis H. Smith, the "Fillet Man" of Akron, O., is distributing a wallet to the trade in anticipation of the bright prospects for '98.

The Ridgeley & Johnson Tool Co., of Springfield, Ill., have issued a catalogue of their valveless pneumatic tools, describing the many purposes for which these can be utilized, which includes the chipping and dressing of all kinds of castings.

Since the dissolution of the combination of Lake Superior Charcoal Furnace Companies, the sale of the entire product of the Hinkle furnace has been given to Rogers, Brown & Co., of Cincinnati, and their branch houses.

The Aetna Sand & Clay Co., of Columbus, O., write us that foundrymen in all sections of the country have kept them busy every day, so far this winter, shipping their well known grades of molding sand. This is something unusual at this time of the year, and indicates that foundries are turning out more work than has been the case for a long time past.

The B. F. Sturtevant Co., of Boston, Mass., in issuing their new catalogue No. 99 on Pressure Blowers, have compiled a vast amount of information which will be of more than passing interest to the foundryman. It has always been the established policy of this company to thoroughly inform those interested in its productions regarding the specific principles and applications of the various systems it has presented, and the present issue shows much study and careful preparation on the part of the publishers.

The Stow Mfg. Co., of Binghampton, N. Y., have issued a new catalogue, designated as No. 7, which illustrates the various appliances made by them. The flexible shaft, which this firm invented and first placed on the market, is continually proving itself applicable in a wider field. Their portable emery grinder has been placed in a large number of foundries, where it has proved itself of the greatest utility in dressing castings, which are too bulky to be handled on the ordinary emery wheel. For certain classes of castings it costs a great deal less to carry the tool to the work than to carry the work to the tool. The largest part of the hand work done in such cases can be accomplished at a fraction of the cost by the Stow portable grinder.

The Sessions Foundry Co., of Bristol, Connecticut, have recently secured a number of important contracts for iron castings for the coming year, among them being a renewal of their previous contract with the Providence Steam Engine Co., well known makers of the Greene engine. This is very heavy work, and when business is good amounts to many tons per day. The Sessions Foundry Company's business for the past year has been the largest in its history and from present indications will be considerably larger the coming year. The capacity of this plant may be judged, when it is known that recently they melted 91½ tons of iron in one day, and could have carried this to beyond a hundred tons, without taxing the capacity of their cupolas to the limit.

Was It a Joke?

A few months ago the daily press teemed with telegraphic news of how the iron workers proposed to erect a colossal statue in memory of a certain party known as Tubal Cain. The Inter Ocean of Chicago reported that the matter had been taken up by the Engineers' Society of Western Pennsylvania and the Pittsburg Foundrymen's Association, "both including many millionaires in their membership, thus insuring prompt financial support." Of course if there are many millionaire foundrymen in the vicinity of Pittsburg, some of these could easily advance the $200,000 which it was calculated to spend for Tubal's benefit. The quietness pervading that neighborhood lately makes us think, however, that it has not been so easy to find the millionaires, or can it be that the promotors are looking for a suitable model?

Just So.

All young men ought to get The Foundry. It has helped me and can help others.

CLAYTON J. SCHWANK.

Bluefield, W. Va.

The man who says that good times are gone forever, is going to be shoved over

The Brink of Prosperity

before long. The lane of hard times is getting close to a turn. Are you ready to go ahead? We have placed a great many new and improved articles on the market, to which we would like to introduce you at your own convenience. Keep posted and keep in front.

THE S. OBERMAYER COMPANY

FACTORIES AT
CINCINNATI, O.; CHICAGO, ILL.;
LARIMER, PA.; WHITE HAVEN, PA.

You have never lost anything

By reading our advertisements, and if the truth was known, they have done you a whole lot of good. We are going to make this month's ad of especial interest to you. You know that blow holes, cold shuts and other minor defects in castings will appear in spite of all the good molders you have in the foundry. These defects, in the majority of cases, are harmful only to the eye, and do not in any way injure the worth of the casting, except by its appearance. How many times we have heard you say, "Too bad to throw such a casting away, but then I know they won't take it." We have an article that will cover up such def cts. It is known as

Paxson's Iron Filler

WILL SAVE YOUR CASTINGS!

It is our own make and will do what is claimed for it. We are selling it all over the country and wherever we have placed it, we have received second orders, showing that it is a money maker of the best kind. It effects a permanent repair and can not be detected.

PRICES REDUCED.

In 25-lb.	Packages,	@	30c	lb. net.
" 10-lb.	"	@	35c	"
" 5-lb.	"	@	40c	"
" 1-lb.	"	@	45c	"

ORDER A SAMPLE POUND.

J. W. PAXSON CO

PIER 45 NORTH, PHILADELPHIA, PA.

A Word

as to

Joseph Dixon Invented the Plumbago Crucible

DATE OF INVENTION
1826.

Dixon's Crucibles have been in the Market SEVENTY YEARS.

Dixon's Plumbago Crucibles

Dixon's Crucibles are Standard all over the **GLOBE.**
Dixon's Crucibles are used in every country on the Globe where metals are melted.
Dixon's Crucibles have the highest records for **HEATS.**
Dixon's Crucibles are made to get

BEST RESULTS WITH THE LEAST COAL.

Dixon's Crucibles are made of many mixtures to suit all kinds of work.
Dixon's Crucibles are made special for Steel Melting.
Dixon's Crucibles are made special for Nickel Melting.
Dixon's Crucibles are made special for Brass Melting.
Dixon's Crucibles are made special for Composition Melting.
Dixon's Crucibles are made special for Phosphor Bronze Melting.
Dixon's Crucibles are made special for German Silver Melting.
Dixon's Crucibles are made special for the Melting of Precious Metals.

In ordering you will be benefitted by mentioning the kind of Metals melted. Write for pamphlet **"How to Use Plumbago Crucibles."** The best are the cheapest, as they must stand the punishment of high heat and much wear and tear. The "Dixon" records in average efficiency, in general good behaviour and in volume of sales, far in the lead.

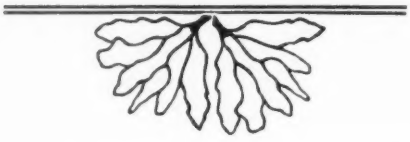
Jos. Dixon Crucible Company,

JERSEY CITY, N. J.

Whitehead Brothers Company,

DEALERS IN

Molding Sand



FIRE SAND,
PHILADELPHIA SAND
FRENCH SAND,
FIRE CLAY, KAOLIN,
FOUNDRY FACINGS
and SUPPLIES
OF ALL KINDS.
LEAD FACINGS
A SPECIALTY.

Albany Sand for Brass and Stove Plate Castings.

537=39 West 27th St.,
NEW YORK.

Providence Office,
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CHEESEQUAKE CREEK, N. J.
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Established 1872. Incorporated 1895.

McCullough-Dalzell Company

PITTSBURGH, PA.

CRUCIBLES for Brass Melting .
CRUCIBLES for Steel Melting .
CRUCIBLES for All Purposes . .
CRUCIBLES of All Sizes . . .
STOPPERS, Twenty-one Styles .
LIDS, COVERS, CAPS, . . .
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ALL
ARTICLES
CONTAINING
PLUMBAGO

Crucible.

ROBT. J. TAYLOR & SON

COR. 19th & CALLOWHILL ST. TRADE MARK. PHILA.

Crucible

Dipper.

Cover.

Stopper.

Crucibles

For melting Steel, Brass, Copper, Gold, Silver, Nickel and Metals and Alloys of Every Description; SmallCrucibles for making Assays and fine pure Plumbago for lubricating, etc.

We are practical workmen and have studied the requirements of the different metal works in this country, as well as in Europe. We also work strictly by chemical analysis, giving a uniformity at all times never before approached in this or any other country.

We make All Sizes, from 8 oz. to 2 ton Capacity.

ROBT. J. TAYLOR & SON,

1900 to 1916
CALLOW HILL STREET, PHILADELPHIA, PA.

We Guarantee..

That one man with one of our **PNEUMATIC HAMMERS** can do more and better work than four men working in the ordinary way.

These same Hammers are also especially adapted for calking boilers and beading flues.

We also manufacture the best Air Drill on the market, and our Air Hoist and Compressors are especially designed for foundry work.

All tools sent on ten days' trial, subject to approval and are guaranteed for one year.

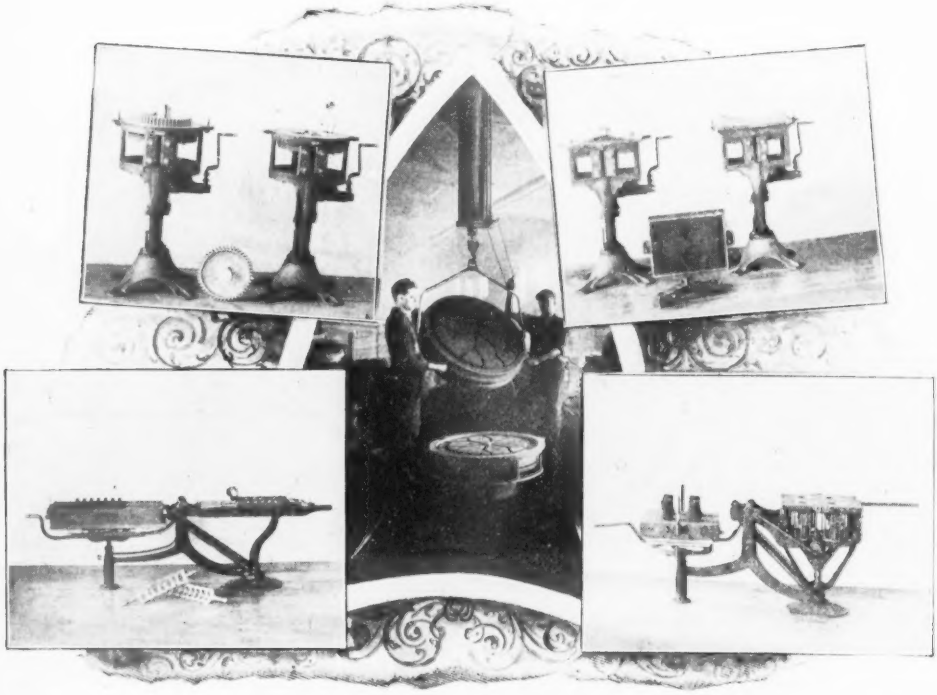
Chicago Pneumatic Tool Co.,

635 Monadnock Building, **CHICAGO, ILL.**

MOLDING MACHINES

FOR ALL CLASSES OF WORK.

STRAIGHT DRAW, ROCKOVER. AUTOMATIC DRAW ROCKOVER,
IN OVER TWENTY DIFFERENT SIZES.



Guaranteed to pay out in Six Months When run to their full capacity.

The Pridmore Molding Machines

INSURE BETTER AND MORE UNIFORM CASTINGS.
LESSEN COST OF MACHINE WORK ON CASTINGS.
LIGHTEN THE LABOR AND SIMPLIFY FOUNDRY METHODS.
SAVE FIFTY TO SEVENTY-FIVE PER CENT.

Those having Grey Iron or Brass Castings to make in reasonable quantities, will do well to write for full information and lists of many foundries now using these machines. Estimates, prices, terms, etc., will be promptly furnished. Rights to use these machines for Malleable Iron and Steel Castings are reserved. Address,

HENRY E. PRIDMORE,

111-113 W. Harrison St., CHICAGO, ILL., U. S. A.

CHAS. M. JARVIS, President. BURR K. FIELD, Vice-President
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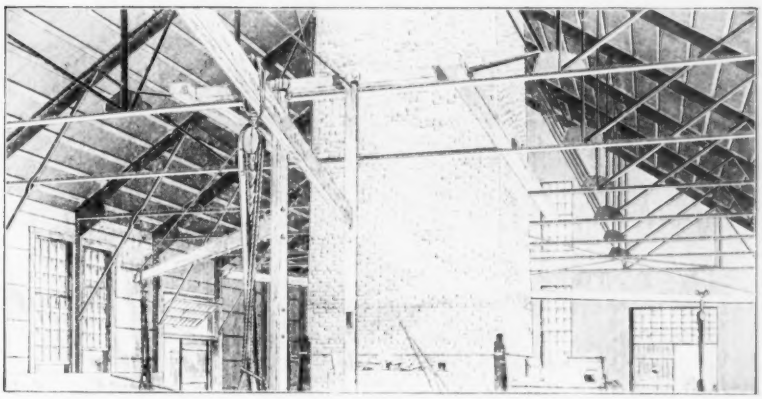
THE BERLIN IRON BRIDGE CO.,

ENGINEERS, ARCHITECTS

-AND BUILDERS OF-

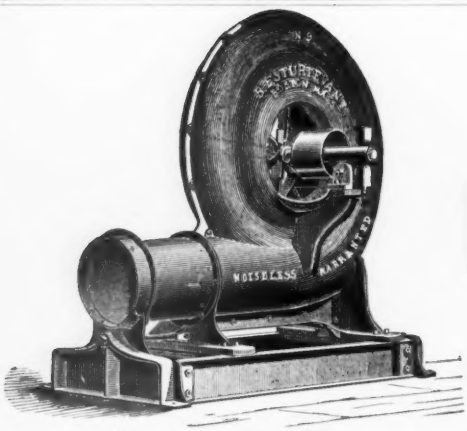
Iron and Steel Bridges, Roofs and Buildings.



The above illustration is taken direct from a photograph, and shows the interior construction of an iron casting shop designed and built by us for the Waterbury Brass Company, at Waterbury, Conn. The building is 52 feet in width by 110 feet in length, and built entirely of iron; that is, iron sides and iron roof. The danger from fire in a brass casting shop is very great, and a construction of this kind eliminates this danger entirely.

Office and Works, - - EAST BERLIN, CONN.

SEND FOR ILLUSTRATED CATALOGUE.



Blower on Adjustable Bed.

THE STURTEVANT STEEL Pressure Blowers,

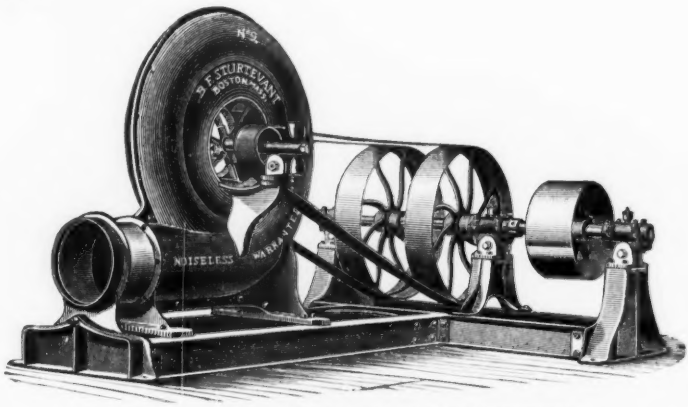
—FOR—

Cupola Furnaces and Forge Fires.

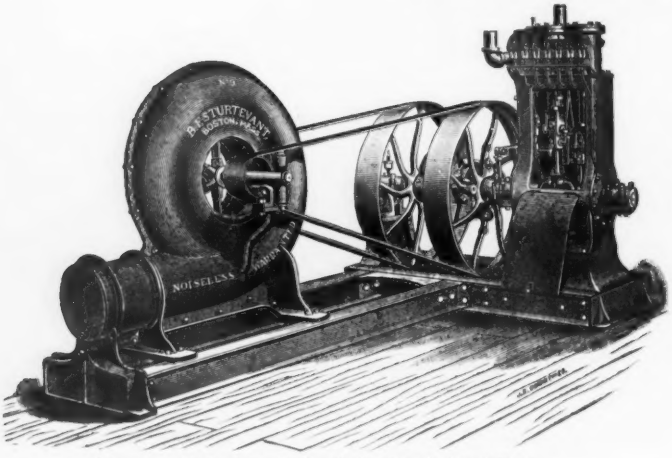
BLOWERS

Furnished without Bed with Separate Countershaft

BLAST GATES



Blower on Adjustable Bed with Combined Countershaft.



Blower on Adjustable Bed with Double Enclosed Engine.

BLOWERS

WITH

THE STURTEVANT

Direct Connected

Electric Motors

Send for Catalogue.

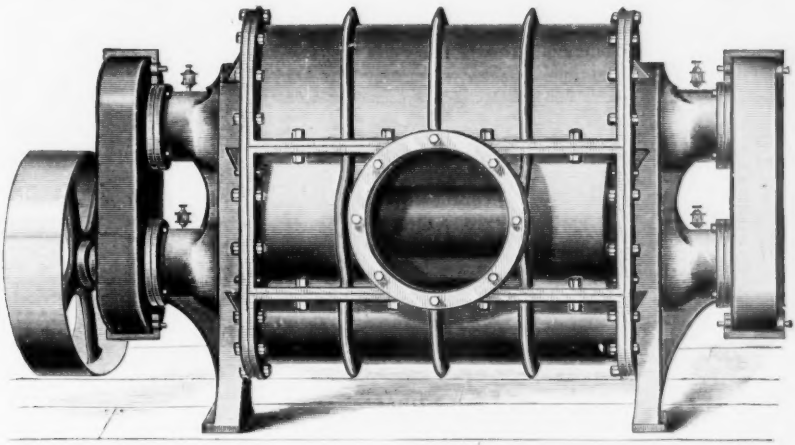
B. F. STURTEVANT CO.,

BOSTON, MASS.

181 Liberty Street, NEW YORK. 135 N. Third St. PHILADELPHIA.
16 S. Canal St. CHICAGO. 75 Queen Victoria St. LONDON.

STOCK CARRIED AT BRANCHES.

The Green Rotary Pressure Blower



Working parts are two perfectly balanced impellers, mounted on the best steel shafts, running in bronze bushes, cut gearing at both ends of the Blower enclosed in oil-tight casing.

Weighs less, occupies less space, costs less for freight than any other POSITIVE BLOWER in existance.

FOUNDRY BLOWERS

High Pressure Blowers

GAS EXHAUSTERS

Exhausters for Hot Gases

The GREEN Gives the Most Value for a $.

Wilbraham Baker Blower Co.,

2518 Frankford Ave., PHILADELPHIA, PA.

WASHINGTON COAL & COKE CO.
Youghiogheny Coal. High Grade Coke.
CAPITAL PAID UP
$250,000.00
DAWSON, PA.
INDIVIDUAL CARS.
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GENERAL OFFICE Dawson Pa
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P. G. COCHRAN President
JNO. H. WURTZ Secretary
J. R. LAUGHREY Treasurer
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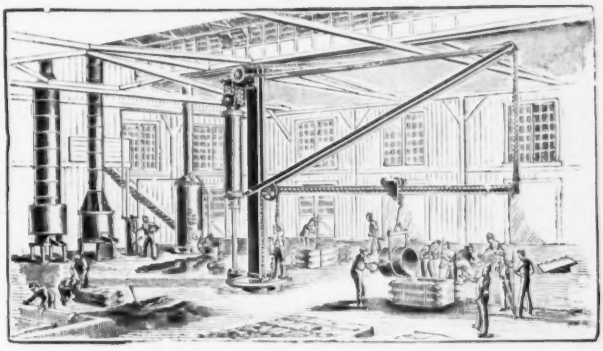
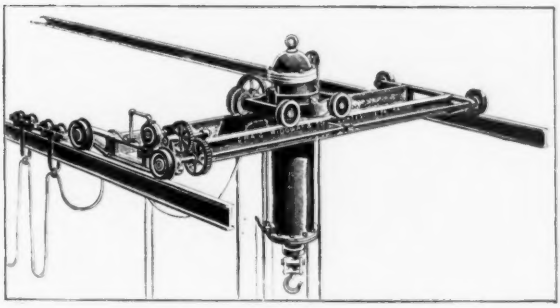
LOOK AT 'EM SWEAT

Maybe you think it wouldn't be big money in your pocket if you relieved your men of all that hard bone labor out there in the mill where they are toiling so hard? Well, you have lots to learn in your business yet. There's your boiler over there full of steam—blowing off even now perhaps—and there is the Ridgway Steam Hydraulic Crane. All you have to do is too hook them together and by the mere pushing of a lever the work is done without effort, and in a few weeks you have saved the whole cost of the crane. "Times too hard to buy cranes." Well, we will give it to you for nothing if you will hand over to us one-half what it will save in wages in one year. We haven't furnished dozens of these cranes not to know what we are talking about, and if you think "Oh, he's got cranes to sell," you can call on the mills and foundries where they are in use and do your own investigating.



5-ton Steam-Hydraulic Crane in a Foundry.

THE AIR HOIST AND THE OIL CAN.



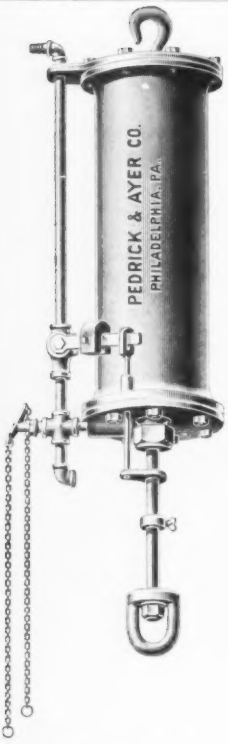
And the oil can does the business for Mr. Air Hoist. A quart or two in its piston rod and behold, the most perfect machine you ever worked with. No more starting of with a jerk, breaking chains and banging and smashing things. Any child can work it and away it goes as smooth and as gentle as the touch of an angel. We ought to call it the Molder's Delight to give it the right name, for it is just the machine foundries have long been asking for.

Don't buy any Air Hoists until you look into this one Circulars for the asking.

"PLEASE TAKE THE ELEVATOR."

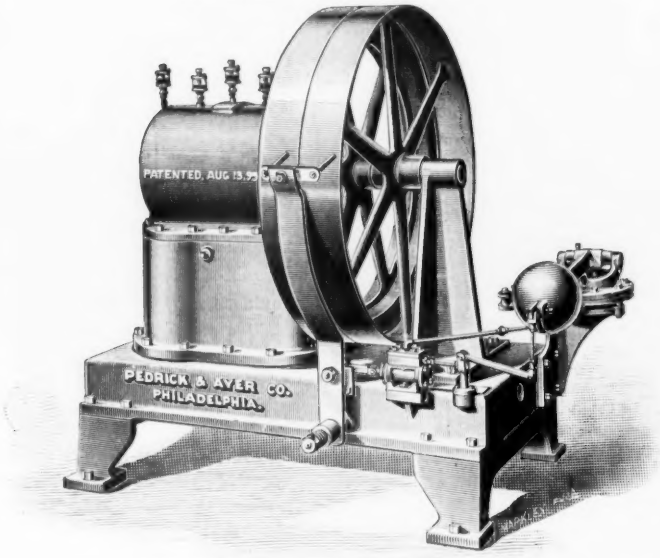
PEOPLE WHO WANT THE BEST BUY IT.

CRAIG RIDGWAY & SON, COATESVILLE, PA.



Automatic Compound Belt Air Compressors.

PATENTED AUGUST 13TH 1895.

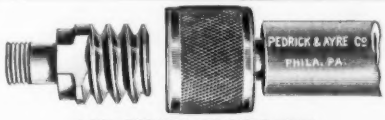


Straight Lift Hoist. **Built in two sizes, Nos. 1 and 2.**

No.	Size of Cylinders in inches	Revolutions per Minute.	Cubic Feet of Free Air	Horse Power Required.	Size of Pulleys in inches	Shipping Weight of Compressor	Floor Space in inches	Telegraphic Symbol
1	11x 6 6x 6	100-100	32- 50	2-3½	40x5	2875 lbs.	60x40	Parian
2	1 x10 8x10	90-120	90-130	9-15	60x6	5370 lbs.	76x60	Parish

HORIZONTAL HOIST.

PAT. SEPT 4TH 1894.



AIR HOSE COUPLING

For ½ inch, ¾ inch and 1 inch Hose.

These Compressors will compress more air at less cost than any other make, requiring no attention other than oiling; entirely automatic in action, stopping and starting as air is required. Specially adapted for foundry use. Can be run in series, if so, no stoppage impossible.

Horizontal Air Lift for low ceilings; for general lifting, quick in action and under perfect control of operator.

Straight Air Lift for foundry purposes when equipped with retaining and releasing valve, will hold the load whether heavy or light, in the desired position, as in case of lifting a ladle of molten iron and pouring it or raising a flask to knock out the sand. It can neither ascend or decend as long as connected to air supply.

Air Hose Couplings are designed to do away with long lines of hose. By having suspended along the air line a number of hose equipped with this device, connections can instantly be made or disconnected, allowing one hoist to serve in several places. Each size made in duplicate. Containing a shut-off valve.

Send for circulars and details to Pedrick & Ayer Co., Pneumatic Department.

PEDRICK & AYER CO.

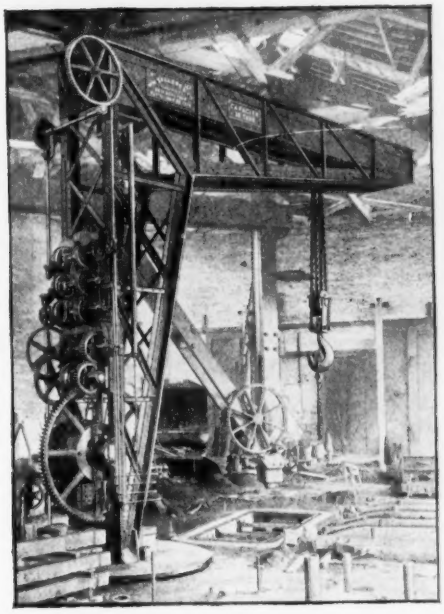
SPRING GARDEN STATION, PHILADELPHIA, PA.

Manning, Maxwell & Moore, *Sole Agents*, 111-113 Liberty St., New York City. 60 South Canal St., CHICAGO, ILL. 424 Telephone Bldg., PITTSBURG.

William Sellers & Co. Incorp.

PHILADELPHIA.

MODERN FOUNDRY MACHINERY



In connection with our Machine Tool Business, we conduct a large foundry where practical tests are continually made of new labor-saving devices. The manufacture of

IMPROVED FOUNDRY CRANES

has become an important feature.

The accompanying illustration shows a quick-acting 30-ton Steam Jib-Crane, erected in the foundry of J. Morton Poole Co., Wilmington, Del., superceding old wooden cranes, one of which appears in the background.

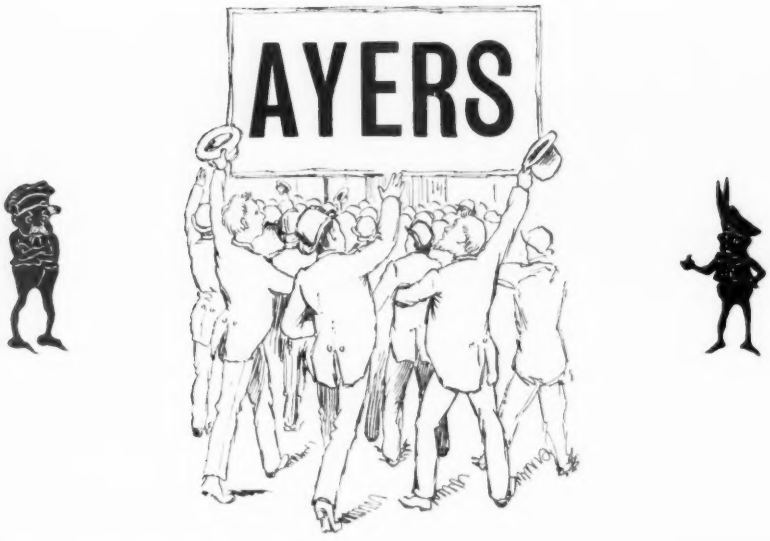
This crane is driven by independent 8" x 8" engines. The platform levers are near the floor. The effective radius of hook is 23 feet.

In future issues of this magazine, we will show illustrations of Jib and Traveling Cranes operated by electric motors.

Centrifugal Sand Mixer

Since the introduction and favorable reception of this effective, expeditious and economical **machine for preparing sand for molds and cores** we have simplified its construction and cheapened its cost. The capacity of the machine is remarkable, being limited only by the facilities for feeding sand into the hopper. Two men will easily shovel 5 tons an hour into the machine.

The qualities of "toughness" and "porosity" are materially improved by this process of preparing molding sand.



It is very common to find foundrymen cheering for

AYERS, the Sand Man!

Those who for the first time find a good molding sand are apt to show their happiness in this manner. . . . . .

Good Molding Sand

is the very foundation of good work; it is one of the greatest factors in cheap production. . . .

The Zanesville is the BEST!

The Different Grades of it will turn out Any Class of Work . . . . .

ITS GOODNESS IS ONLY SURPASSED BY ITS CHEAPNESS.

E. M. AYERS ✳ MARKET BLOCK . . ZANESVILLE, OHIO.

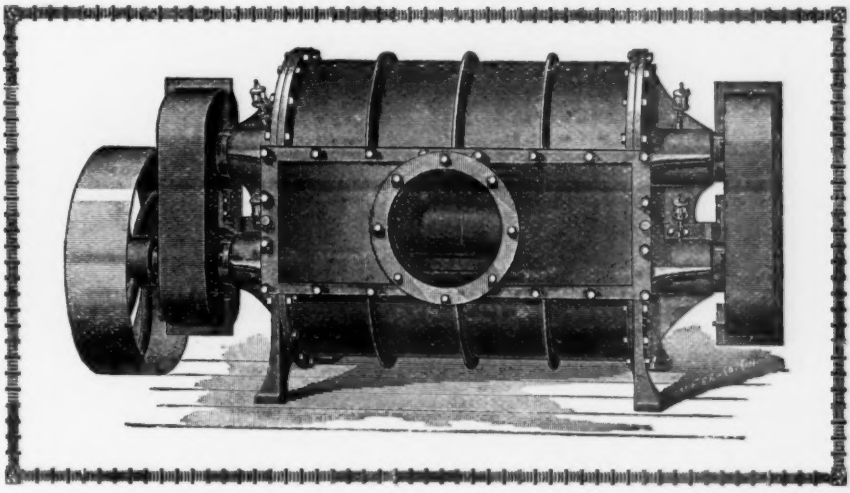
. . . OVER . . .

30,000

HAVE BEEN PUT
ON THE MARKET

ROOTS' . .

Positive.. Pressure Blowers..



OUR BLOWERS

Embody an experience of forty years' in the construction of machines of this type . . . . . .

P. H. & F. M. ROOTS Co.

CONNERSVILLE, IND.

NEW YORK OFFICE, 109 Liberty Street.

ROOTS'

Rotary Pressure Blower

Is used in almost every Country on the Earth's surface.

THEY REPRESENT

In their manufacture the concentrated experience and wisdom of some of the world's best mechanics and have become famous for the perfection of their workmanship, as well as their efficiency and economy.

PERFECTLY SATISFACTORY SERVICE.

Pittsburg, Pa., February 27, 1895.

P. H. & F. M. Roots Co., Connersville, Ind.:

Gentlemen—In reply to your inquiry of the 25th inst., we beg to say that we have been using your No. 4 Blower, without engine, for our cupola furnace, and it has given us perfectly satisfactory service.

Yours truly,
THE McCONWAY & TORLEY CO.,
C. P. Krauth, Sec'y.

ROOTS' BLOWERS FAR SUPERIOR.

Joliet, Ill., March 7, 1892.

P. H. & F. M. Roots Co., Connersville, Ind.:

Gentlemen—Replying to your favor of March 1st, we are pleased to report that the No. 6 Blower, purchased of you some time ago, has given us good satisfaction. We have used in our works both Fans and Blowers, but must confess that we consider the Roots Blower far superior.

Very truly,
BATES MACHINE CO.,
E. E. Wolcott, Asst. Supt.

EIGHT YEARS AND STILL IN FIRST-CLASS CONDITION.

Cincinnati, O., May 24, 1895.

P. H. & F. M. Roots Co., Connersville, Ind.:

Gentlemen—We take pleasure in stating that we have had 4 of your large Roots Blowers in use at our works for 8 years. These Blowers have given thorough satisfaction and are still in first-class condition.

Very truly,
THE ADDYSTON PIPE & STEEL CO.,
Eliot A. Kebler, Sec'y.

P. H. & F. M. Roots Co., Connersville, Ind.

NEW YORK OFFICE, 109 Liberty Street.

Powellton Coke

**Is Physically and Chemically equal—
in many respects superior—
to any Coke made.**

Its Ash and Sulphur, especially Ash, is much lower than the Standard Coke, whilst its Carbon is correspondingly increased. We guarantee it to be uniform and to give the very best results, and those who know us, know that our guarantee is good.

It is made up as follows:

Coke, 46.48 per cent.
Cells, 53.52 per cent.

We have no fear of contradiction

when we say that no other so closely approaches the ideal Coke, which has been found to be . . . . . .

Coke, 44.00 per cent.
Cells, 56.00 per cent.

The Cell Walls of the Coke

are bright and hard, and careful tests by eminent authorities have demonstrated that it will support, without crushing, a cupola charged fully 25 per cent. greater than the Standard Connellsville. . .

Don't you think it would pay you to try it.

Write for Prices, and Physical and Chemical Tests. References too, if you want them.

The Mount Carbon Company, Ltd.

POWELLTON, WEST VIRGINIA.

DIRECTORY OF LEADING PIG IRON DEALERS.

HUGH W. ADAMS & CO.

Pig Iron Merchants

15 Beekman Street, NEW YORK

Boston Office, 85 Water Street

MATTHEW ADDY & CO.

CINCINNATI, ST. LOUIS.

Agencies,

Chicago, Detroit, New York,

Philadelphia.

CLINTON IRON & STEEL CO.

Manufacturers of the

CLINTON INSPECTED FOUNDRY IRON

CELEBRATED "CLINTON" SOFTENER

PITTSBURG, PA

15 Cortlandt St., NEW YORK.

THE DOMHOFF & JOYCE CO.

PIG IRON-COKE.

CINCINNATI.

F. A. GOODRICH & CO.

Incorporated

PIG IRON, STEEL, COKE, ETC.

Detroit, Mich.

M. A. HANNA & CO.,

COAL, IRON ORE
and PIG IRON.

Cleveland, Ohio.

PICKANDS, BROWN & CO.,

Manufacturers, Importers
and Dealers in

PIG IRON AND IRON ORE.

Rookery Building, CHICAGO.

PICKANDS, MATHER & CO.,

PIG IRON.

Cleveland, Ohio.

ROGERS, BROWN & CO.

CINCINNATI, CHICAGO,

BUFFALO,

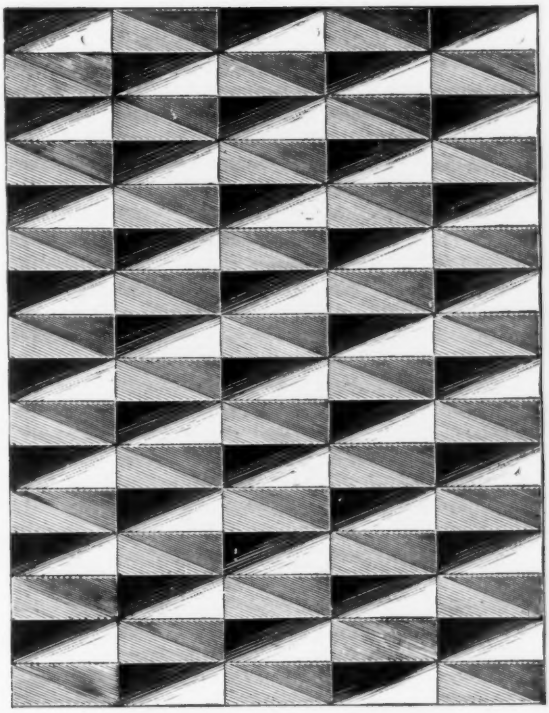
PHILADELPHIA, NEW YORK,

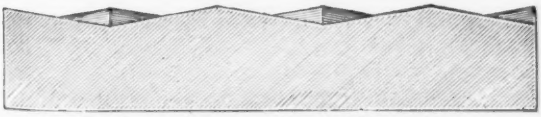
ST. LOUIS

STEVENSON, FIELD & CO.

PIG IRON and COKE,

Columbus, O. St. Louis, Mo.





The above cut shows exact size of Diamonds.

Diamond Pattern Lumber,

—FOR—

DOOR SILLS, PLATFORMS, STEP PLATES, Etc.

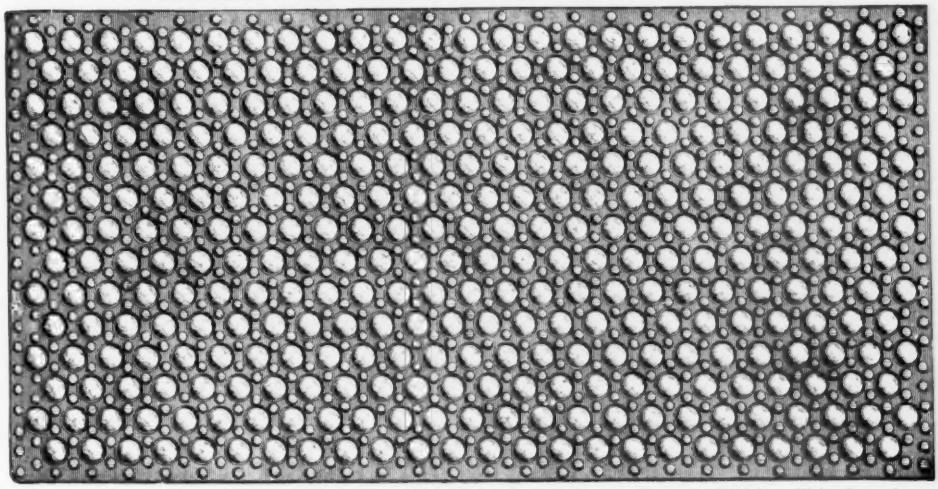
This Patent Lumber is made by a Special Machine invented by us, the ONLY Machine of its kind, and each piece will match PERFECTLY with all other pieces, by "joining" the edges to the centre, lengthwise, or any row of Diamonds.

Size of each piece, 8 feet long by 6 inches wide, and ¼ inch thick. Price 10 cents per running foot of 6 inches in width, NET CASH crated and delivered f. o. b. Chicago, in orders of not less than 6 pieces. Send for sample.

BROWN BROS. MFG. CO.

Cor. Clinton and Jackson Sts. Chicago.

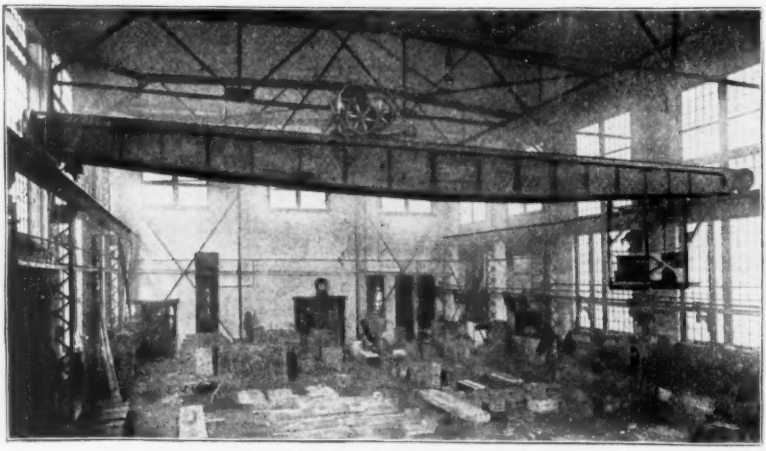
PRISMATIC SIDEWALK LIGHT TILE.



Make your own frames and we will furnish you with Tiles for either Iron or Concrete Lights. Write for prices.

BROWN BROS. MFG. CO.,

Cor. Jackson and Clinton Sts. CHICAGO.



50-FOOT SPAN ELECTRIC THREE MOTOR CRANE.

Whiting Foundry Equipment Co

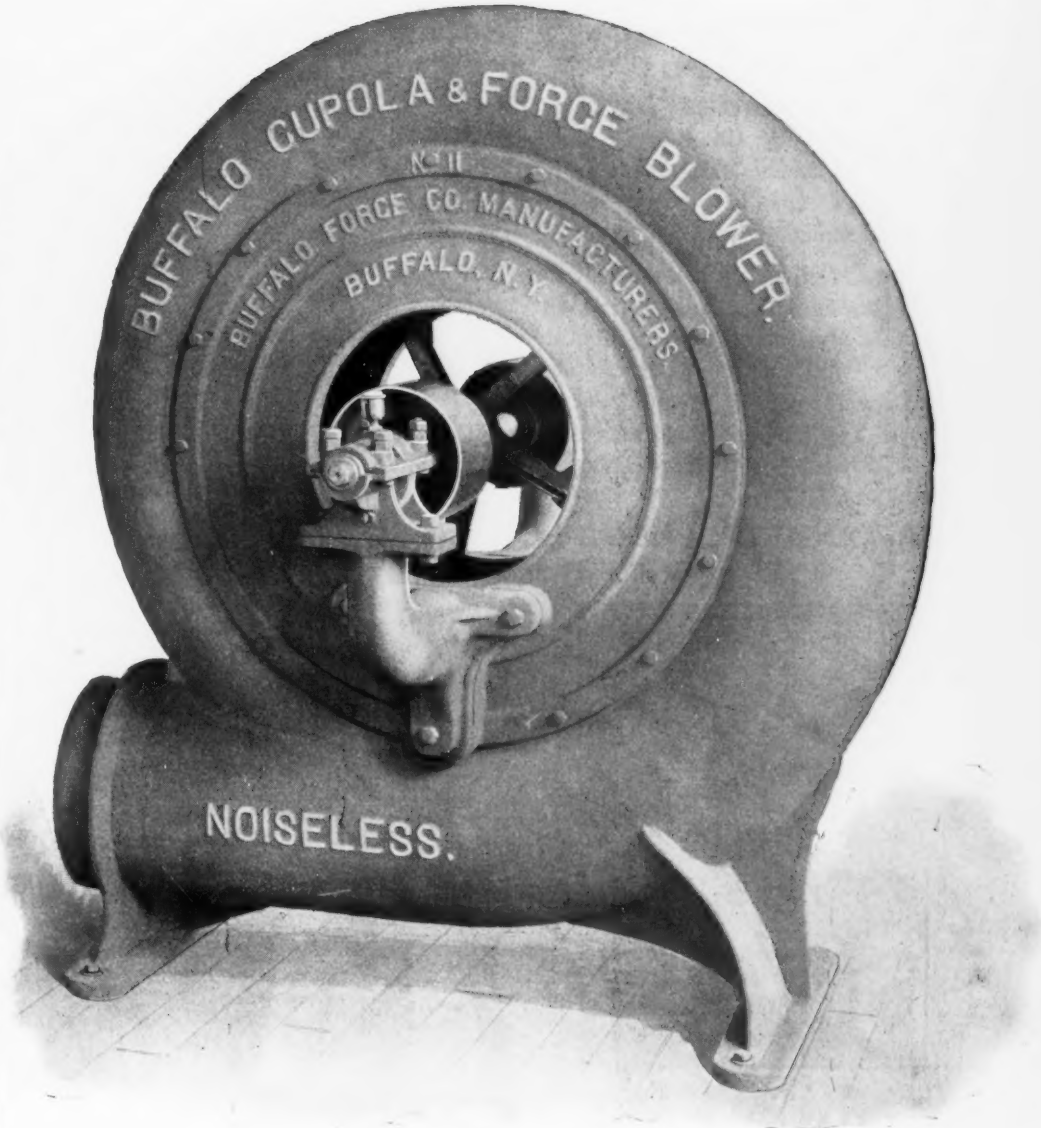
Works, HARVEY, ILL. (Chicago Suburb.)

No modern foundry should be without modern cranes. They can be either Electric, Compressed Air, Belt or Hand Power and still be modern if designed for the place and the duty. Prices, catalogues or photos on request . . . . . :

There are more WHITING CUPOLAS being sold now than ever before. The standard cupola for all classes of foundry work. Get prices.

LADLES, TRUCKS, TUMBLERS, TURNTABLES.

SEND FOR CIRCULAR.

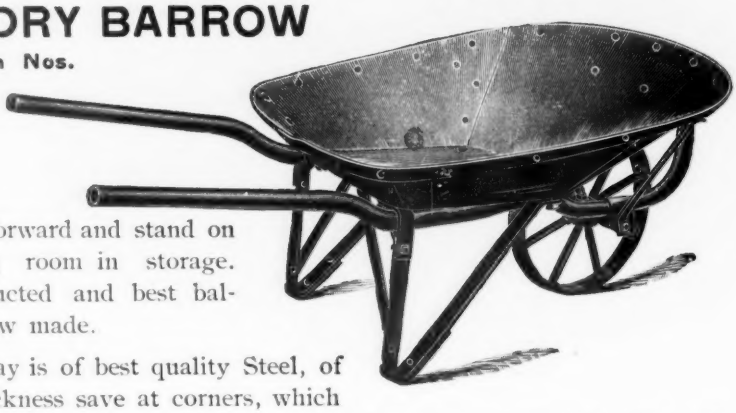


Furnished with Combined Adjustable Bed and Countershaft where desired.

"SYRACUSE" Steel Wheelbarrows

FOUNDRY BARROW

Ten Nos.



All dump forward and stand on end, saving room in storage. Best constructed and best balanced Barrow made.

The Tray is of best quality Steel, of uniform thickness save at corners, which are of double thickness, being smoothly lapped and riveted. The edges are rolled over a band of steel riveted under the flange. The Legs have renewable Steel Shoes. Patent Steel Wheel with Staggered Spokes. Heavily braced throughout. The most durable and easily handled Barrow made. Steel Charging and other Barrows in variety. Send for handsome Illustrated Barrow and Truck Catalogue No. 6

SYRACUSE CHILLED PLOW CO., Syracuse, N. Y.

Look at the Wood We Burn into . . **CHARCOAL**

NO WONDER OUR

CHARCOAL FACING

is used in so many Brass and Stove Foundries.

LET US TALK IT OVER WITH YOU.

Springfield Facing Co. SPRINGFIELD MASS

Eberhardt's Patented Sprue or Gate Cutter

Dear Sir:—The machine fills the bill; am just delighted with it.
Yours truly,
Maryland Brass & Metal Works,
Baltimore, Md.

Price Low

Send to

GOULD & EBERHARDT, NEWARK, N. J.

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THE FOUNDRY

The only foundry paper published in the world, and an authority on all matters pertaining to the foundry business.

RATES OF SUBSCRIPTION.

Single subscription to all parts of the United States and Canada, $1 per annum.
" " Universal Postal Union, 1.75 "
Eight or more subscriptions at one time, 75 cents each.

ADVERTISING RATES.

One page - -	per month, $20.00
Half page - - -	" 12.00
Quarter page - -	" 7.00

When space is specified an extra charge of five per cent. on the above figures will be made. All pages between front cover and reading matter reserved for whole page advertisements.

Advertisers in THE FOUNDRY have the privilege of discontinuing their advertisements at any time after they have had three insertions, and will only be charged pro rata for the number of insertions printed. They also have the privilege of changing advertisements as often as desired.

The publishers of THE FOUNDRY appreciate the fact that it is customary for publications, especially the class known as Trade Journals, to quote a rate for advertising from which greater or less discounts are given, according to the persistency of the advertiser. This system is manifestly unfair as tending to show partiality. We have deducted the usual discount before quoting rates thus giving it to all alike, and no reduction of any sort on the above rates can be made.

Copy for advertisements must be in by the 20th of the month preceding publication to insure insertion.

The Coburn Patent Trolley Track

PARLOR DOOR HANGERS.

The adjustment is in the Track and not in the Hanger, as are others.

☞Send for Book.

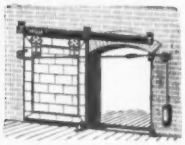
The Coburn Patent Trolley Track

BARN DOOR HANGERS.

Impossible for door to jump the track. Very simple and cheap to apply.

☞Send for Book.

The Coburn Patent Trolley Track



FIRE DOOR HANGERS.

Recommended and adopted by fire underwriters all over the United States.

☞Send for Book.

The Coburn Patent Trolley Track

Overhead Tramway

Furnished complete with straight and curved track, switches, frog brackets, single and double carriers.

☞Send for Book.

The Coburn Patent Trolley Track

—AND—

Patent Rolling Ladder Systems

Over 10,000 in use in the U. S. Roll suspended from ceiling or facing the shelves.

☞Send for Book.

The Coburn Trolley Track Mfg. Co.,

HOLYOKE, MASS.

GLUTROSE

(Trade Mark.)

The Universal Liquid Core Compound

Patented in the United States, England, France and Belgium.

GLUTROSE was invented and is manufactured by a practical foundryman of many years' experience, It has been used in the Pennsylvania Railroad Foundry at Altoona and other large foundries for the past three years with the most satisfactory results.

It is cheaper and better than flour, rosin, oil or any other compound in use; takes the place of all other materials and never varies in quality.

Makes the most difficult cores for iron or brass of any size.

The cores come out easily and leave the castings smooth.

Will let the air and gases off from a core which is difficult to vent better than any other material in use and makes no offensive smell or smoke.

WILL NEVER BLOW THE CASTINGS.

AMERICAN GLUTROSE WORKS

Sole Manufacturers.

OFFICE: PENN MUTUAL BUILDING,

No. 925 Chestnut St., Philadelphia.

ESTABLISHED 1854.

Brooklyn Fire Brick Works

CUPOLA BLOCKS, FIRE SAND, FIRE CLAY, FIRE MORTAR, KAOLIN

AND ALL FIRE MATERIAL REQUIRED FOR FOUNDRY PURPOSES.

Send for Illustrated Catalogue and Prices.

88 Van Dyke Street, BROOKLYN, N. Y.

BUYERS' DIRECTORY.

ALUMINUM.
Cowles Electric Smelting & Aluminum Co., Lockport, N. Y.

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Pedrick & Ayer, Philadelphia, Pa.
Whiting Foundry Equipment Co., Harvey, Ill.

AIR COMPRESSORS.
Pedrick & Ayer, Philadelphia, Pa.

BLOWERS.
Buffalo Forge Co., Buffalo, N. Y.
Connersville Blower Co., Connersville, Ind.
Root, P. H. & F. M. Company, Connersville, Ind.
Sturtevant Company, The B. F., Boston, Mass.
Wilbraham Baker Blower Co., Philadelphia, Pa.

BRASS FOUNDERS' SUPPLIES.
Estate of Oscar Barnett, Newark, N. J.
Garden City Sand Co., Chicago.
J. W. Paxson Co., Philadelphia, Pa.

BRONZES.
Cowles Electric Smelting and Aluminum Co., Lockport, N. Y.

CHARCOAL.
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Springfield Facing Co., Springfield, Mass.

COKE.
Mount Carbon Co., Ltd., Powellton, W. Va.
Washington Coal and Coke Co., 7 Wood St., Pittsburg, Pa.

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Holland Linseed Oil Co., Chicago.
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Vreeland Tompkins, Jersey City, N. J.

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J. W. Paxson Co., Philadelphia, Pa.
Millett Core Oven Co., Brightwood, Mass.

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Whiting Foundry Equipment Co., Harvey, Ill.

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McCullough-Dalzell Co., Pittsburg, Pa.
Taylor Crucible Co. Robert J., Philadelphia, Pa.

CUPOLAS.
J. W. Paxson Co., Philadelphia, Pa.
Whiting Foundry Equipment Co., Harvey, Ill.

ELEVATORS.
Ridgway & Son, Craig, Coatesville, Pa.

FIRE-BRICK.
Brooklyn Fire Brick Works, Brooklyn, N. Y.
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J. W. Paxson Co., Philadelphia, Pa.
Obermayer Company, The S., Cincinnati, O.
Smith Foundry Supply Company, The J. D., Cincinnati, Ohio.
Whitehead Bros. Co., New York.

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Whitehead Bros. Co., New York.
Whiting Foundry Equipment Co., Harvey, Ill.

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Garden City Sand Co., Chicago.
Joseph Dixon Crucible Co., Jersey City, N. J.
J. S. McCormick Company, Pittsburg, P
J. W. Paxson Co., Philadelphia, Pa.
Obermayer Company, The S., Cincinnati, O.
Smith Foundry Supply Co., Cincinnati, Ohio.
Springfield Facing Co., Springfield, Mass.
Whitehead Bros. Co., New York.

GRINDING MACHINERY.
Stow Mfg. Co., Binghampton, N. Y.

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The Adams Co., Dubuque, Ia.
Tabor Mfg. Co., Elizabeth, N. J.

MOLDING SAND.
Ayers, E. M., Zanesville, Ohio.
Garden City Sand Co., Chicago, Ill.
J. W. Paxson Co., Philadelphia, Pa.
Whitehead Bros. Co., New York.

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Brown Bros. Mfg. Co., Chicago.

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Clinton Iron & Steel Co., Pittsburgh, Pa.
Superior Charcoal Iron Co., Detroit, Mich.

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Chicago Pneumatic Tool Co., Chicago, Ill.

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Garden City Sand Co., Chicago.
Joseph Dixon Crucible Co., Jersey City, N. J.
J. S. McCormick Company, Pittsburg, Pa.
McCullough-Dalzell Co., Pittsburg, Pa.
Obermayer Company, The S., Cincinnati, O.
Paxson & Co., J. W. Philadelphia, Pa.
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Springfield Facing Co., Springfield, Mass.
Whitehead Bros. Co., New York.

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SAND BLAST MACHINERY.
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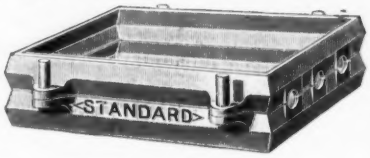

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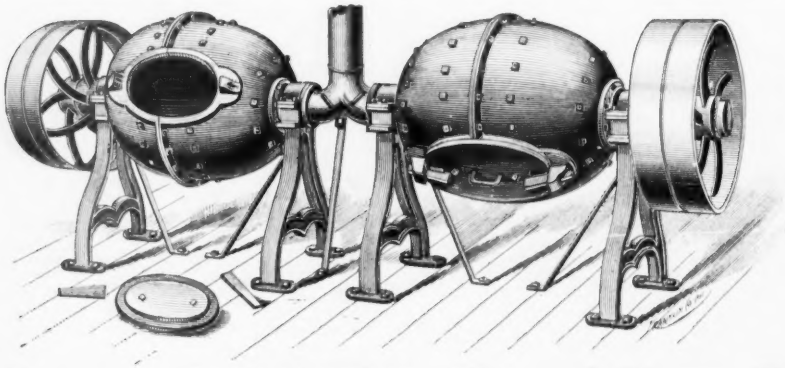

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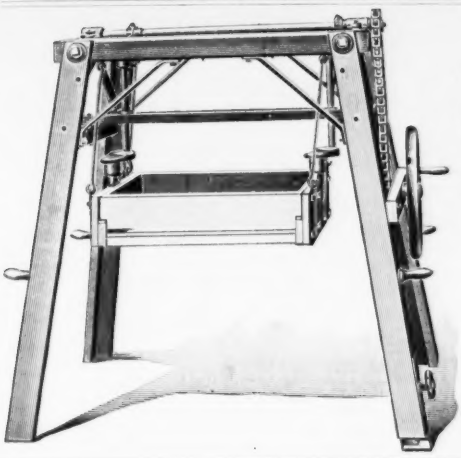

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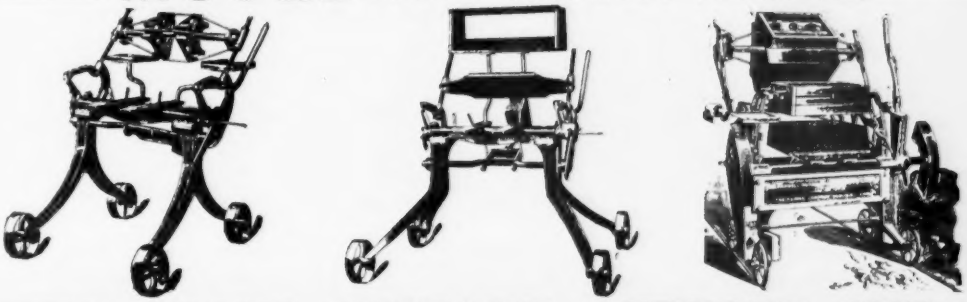

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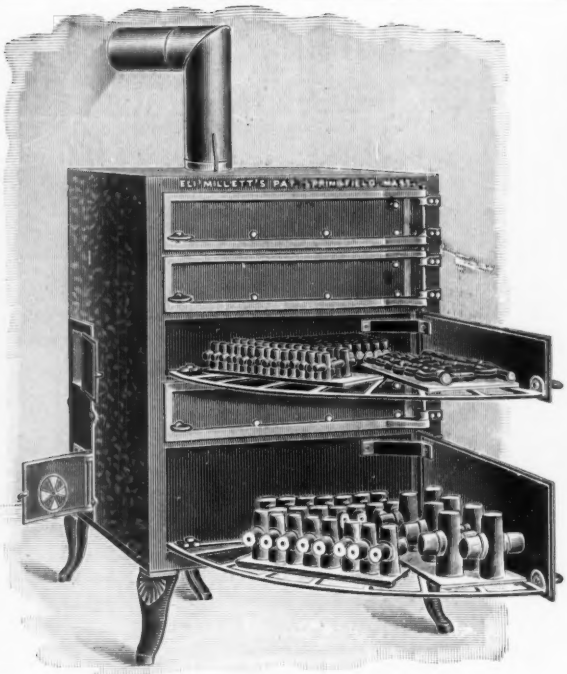

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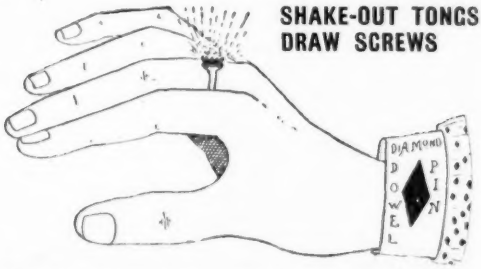

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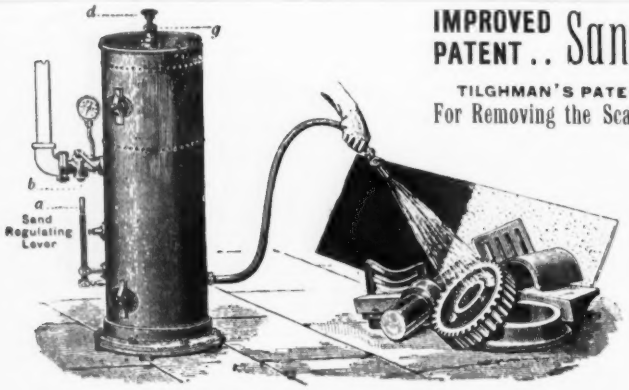

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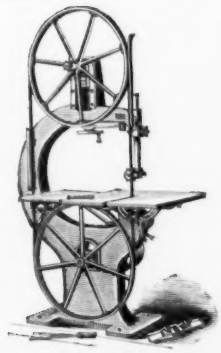

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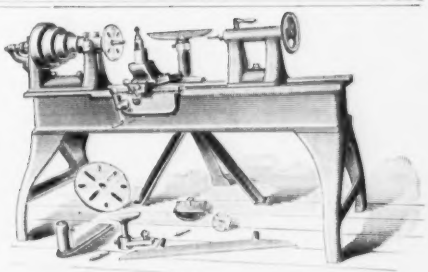

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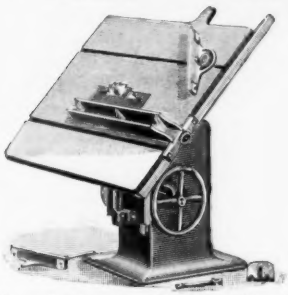

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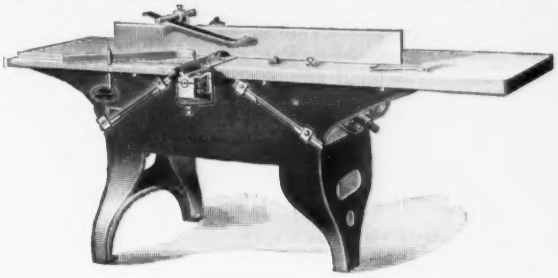

"Metallurgy of Cast Iron."

A SAMPLE PRESS OPINION.

JOURNAL OF COMMERCE (Chicago), of March 6th, says: "Thomas D. West, an authority on foundry practice, of Sharpsville, Pa., has just added another important and valuable contribution to iron and steel literature in a new volume entitled 'Metallurgy of Cast Iron.' The book contains 573 pages, bound in cloth, and is the most progressive, substantial and exhaustive work on this subject that has been issued. Mr. West is a practical molder and foundry manager, a member of the leading technical associations, and his text books are acknowledged authority with practical foundrymen and scientific men alike, his subject involving a scope that interests the blast furnaceman, the engineer, the designer and specialist. His late treatise on cast iron is in advance of the times. The breadth and depth of the work are remarkable, and it should become a standard text and reference volume in all technical schools. Some original experiments are given that are in the nature of valuable revelations, and tables and matters of weight, temperature and specialties in foundries are elaborately treated. Mr. West seems to possess a certain subtle faculty of eliminating confusing minutiæ, and matters are set forth so clearly that there are very few engaged in any line of iron and steel, even as mere handlers and agents, who may not secure a vast practical benefit from this work."

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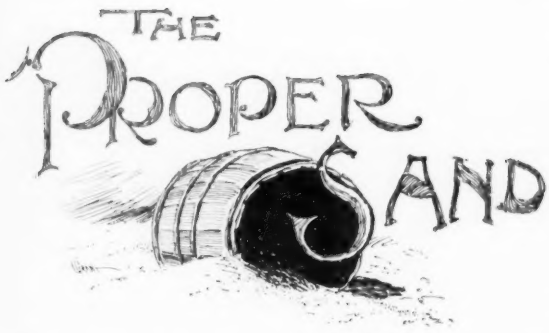

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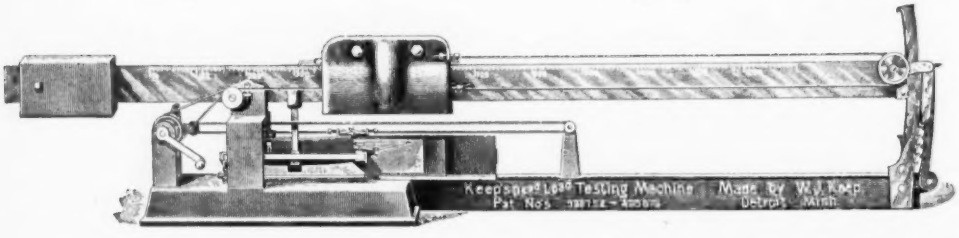

HERE IS WHAT ONE LARGE CONCERN SAYS:-IT HAS PAID THEM, WHY NOT YOU?

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DEAR SIR: We have regulated our foundry mixture by "Keep's Test" during the past year, and can recommend it in highest terms. We know exactly what we are doing and can keep our castings of uniform quality. We find that .160 inches per foot the best shrinkage, and have been able to keep the average strength of a test bar ½ inch square and 12 inches long at 450 pounds.

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A Word

as to

Joseph Dixon Invented the Plumbago Crucible

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Dixon's Crucibles have been in the Market SEVENTY YEARS.

Dixon's Plumbago Crucibles

Dixon's Crucibles are Standard all over the **GLOBE.**
Dixon's Crucibles are used in every country on the Globe where metals are melted.
Dixon's Crucibles have the highest records for **HEATS.**
Dixon's Crucibles are made to get

BEST RESULTS WITH THE LEAST COAL.

Dixon's Crucibles are made of many mixtures to suit all kinds of work.
Dixon's Crucibles are made special for Steel Melting.
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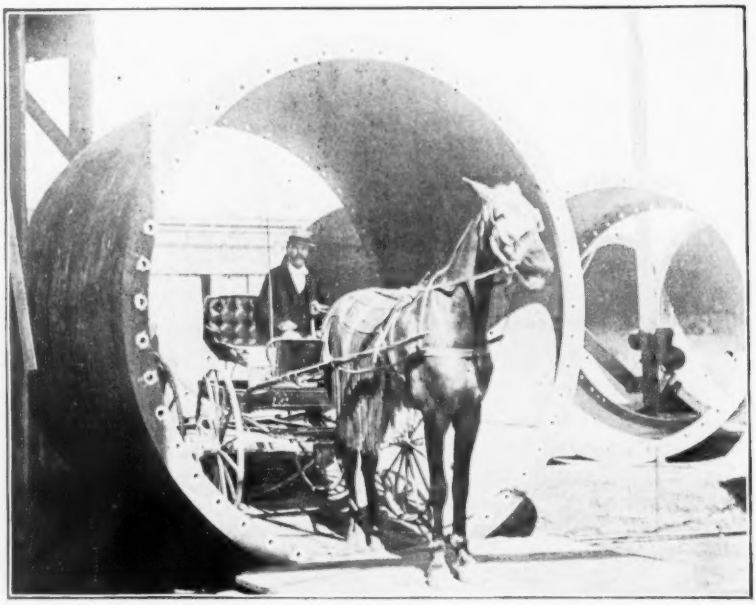

The above cut shows five of the large Pipes cast by a Cleveland Foundry for that city. There were seven cast, of the following dimensions; 9 feet long, 11 feet in diameter, 2½ inches thick and weighing 26,000 pounds, and 16 cast of the following dimensions: 9 feet long, 9 feet in diameter, 2½ inches thick and weighing 22,000 pounds. Our **C.F.M. Founders' Perfect Wash** was used on them all and the loam dropped off clean inside and out when the Pipes were drawn from the mold.

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C.F.M. PERFECT WASH C.F.M.

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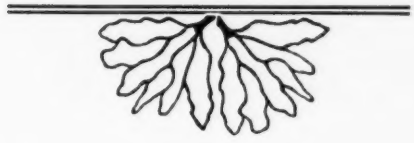

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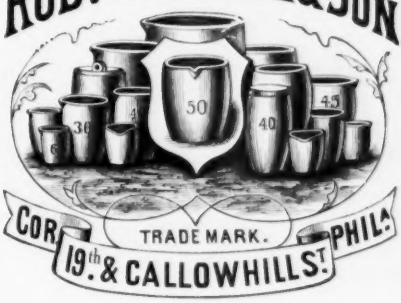

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Dipper.

Cover.

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Crucibles

For melting Steel, Brass, Copper, Gold, Silver, Nickel and Metals and Alloys of Every Description; SmallCrucibles for making Assays and fine pure Plumbago for lubricating, etc.

We are practical workmen and have studied the requirements of the different metal works in this country, as well as in Europe. We also work strictly by chemical analysis, giving a uniformity at all times never before approached in this or any other country.

We make All Sizes, from 8 oz. to 2 ton Capacity.

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That one man with one of our **PNEUMATIC HAMMERS** can do more and better work than four men working in the ordinary way.

These same Hammers are also especially adapted for calking boilers and beading flues.

We also manufacture the best Air Drill on the market, and our Air Hoist and Compressors are especially designed for foundry work.

All tools sent on ten days' trial, subject to approval and are guaranteed for one year.

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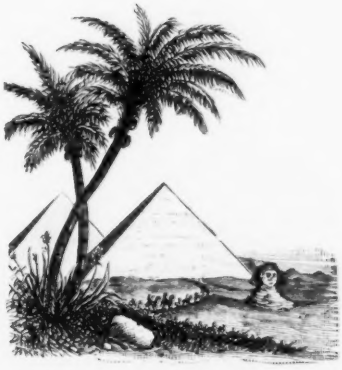

The Pyramids are lasting

TESTIMONIALS to the success attending the selection of the right material. At the present day, in times of close margins, the selection of suitable materials is no less important. More time and money is wasted in our foundries trying to get along with Sand dug up in their back yards, than in any other item. Every extra gagger your molders have to set is a direct loss. Every extra minute it takes to clean your castings increases the cost of their production. Every extra pound of sea coal or blacking used, means the same thing.

With cheap freight rates to all parts of the country, the best of molding sands—**The Zanesville**—can be laid down at your door at incredibly low cost. We have made a business of satisfying the foundrymen's want in this line for years.

Give us a trial order and tell us what class of work you are making.

ZANESVILLE, OHIO.

Ayers, The Sand Man

Powellton Coke

• • •

Fulton's Table Exhibiting the Physical and Chemical Properties of Coke.

		Connellsville.	*Powellton.*
Grammes in one cubic inch,	Wet,	23.67	22.93
	Dry,	15.47	14.16
Pounds in one cubic foot,	Wet,	87.24	87.33
	Dry,	58.98	53.88
Percentage by volume,	Coke,	49.96	46.48
	Cells,	50.04	53.52
Compressive strength per cubic inch (¼) ultimate strength		301	381
Height of furnace charge supported without crushing,		120	152
Order in cellular space		1	1¼
Hardness		3.5	3.0
Specific gravity		1.89	1.86

ANALYSIS.

Fixed Carbon	87.46	91.048
Moisture	0.49	0.117
Ash	11.32	7.548
Sulphur	0.69	0.626
Phosphorus	0.029	0.007
Volatile Matter	.011	0.661

AVERAGE OF FOUR TESTS.

(Signed) JNO. FULTON, E. M.

[Chemical Analysis by Prof. Andrew S. McGreath.]

The Mount Carbon Co. Ltd.

Powellton, W. Va.

CUPOLA BLOWER.

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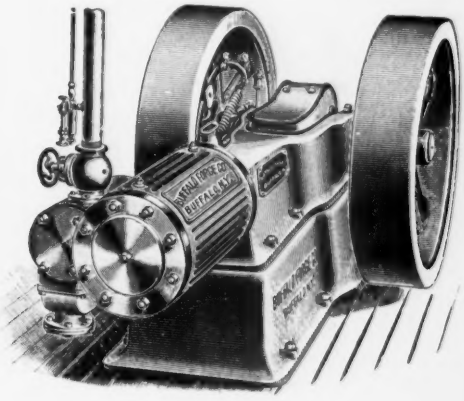
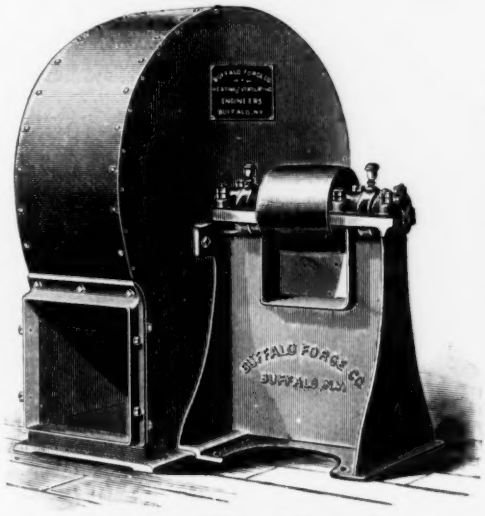
BUFFALO FORGE Co.'s Automatic Cut-off Engine, Horizontal and Upright types for Electric Lighting and Power purposes, direct connected or belted. 1896 Sectional Catalogue furnishes full details.



CLASS "A" HORIZONTAL.



TUMBLING BARREL EXHAUSTER.

Tumbling Barrel Exhausters are easily applied, thoroughly efficient, and change casting cleaning rooms from a death-dealing pestilence to a comfortable working apartment. Send for details.

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BUFFALO, N. Y., U. S. A.

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Write Us To-day.

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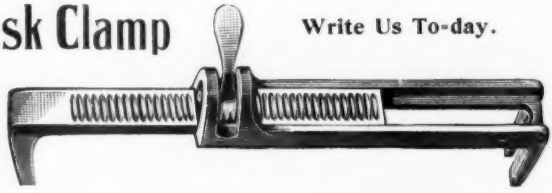

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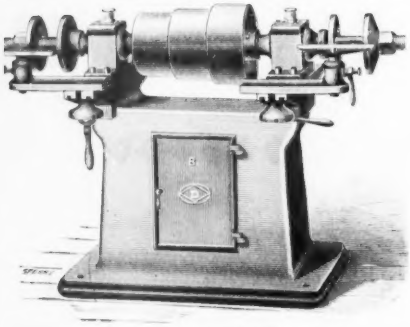

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Big, Heavy Grinder

For foundry work, here it is. We also have smaller and larger sizes. Our catalogue No. 19 tells all about them.

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Look at the Wood We Burn into . . **CHARCOAL**

NO WONDER OUR

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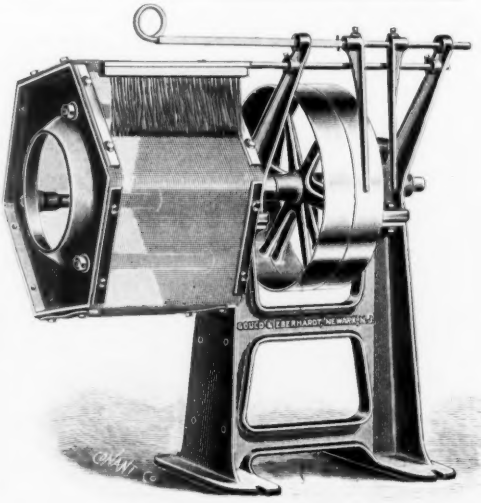
is used in so many Brass and Stove Foundries.

LET US TALK IT OVER WITH YOU

Springfield Facing Co. SPRINGFIELD MASS



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GOULD & EBERHARDT, NEWARK, N. J.

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The adjustment is in the Track and not in the Hanger, as are others.

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Impossible for door to jump the track. Very simple and cheap to apply.

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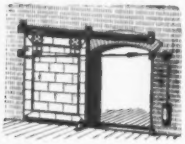

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The cores come out easily and leave the castings smooth.

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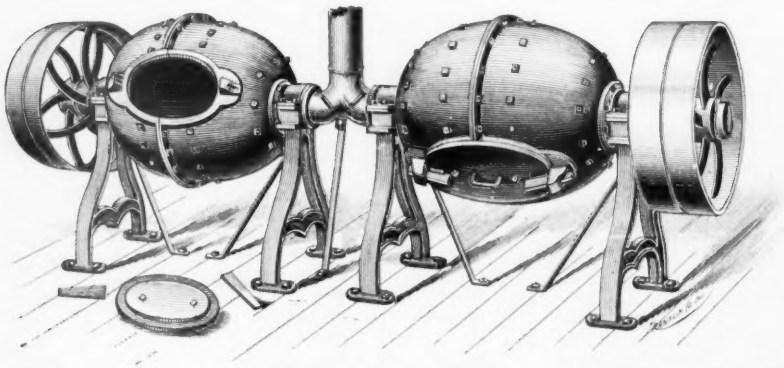

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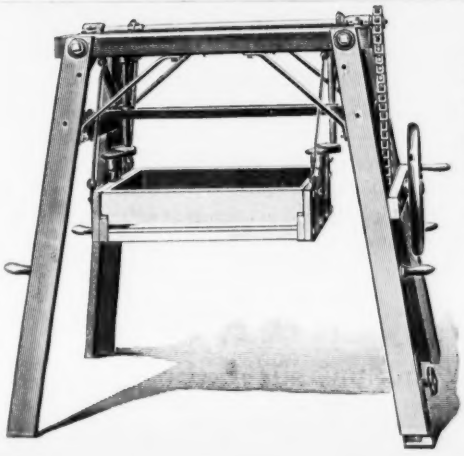

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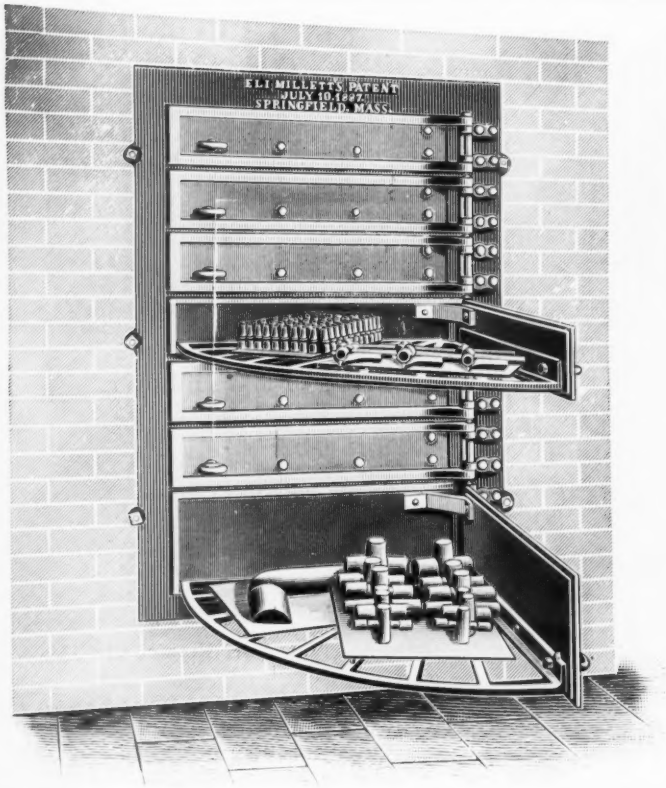

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Over one hundred and fifty in use.

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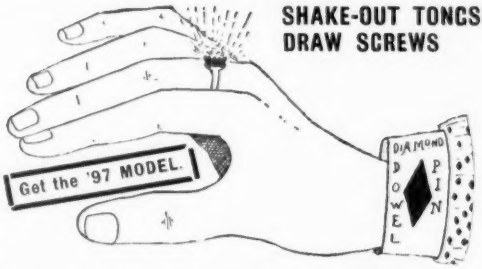

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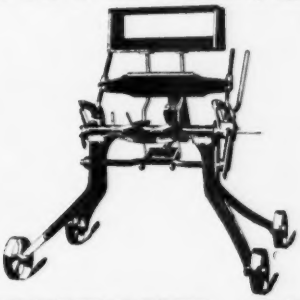
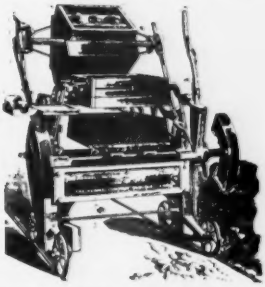

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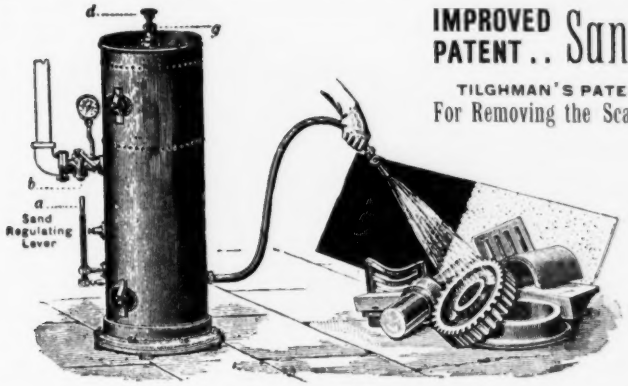

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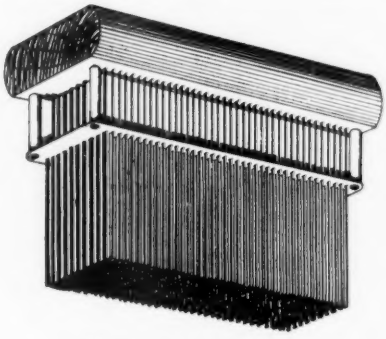

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The oldest and largest manufacturers in the world

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Take the tool to the work and save heavy handling.

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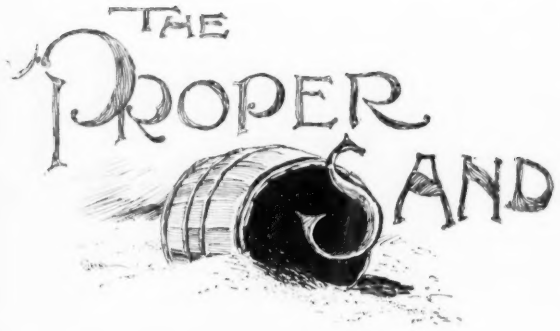

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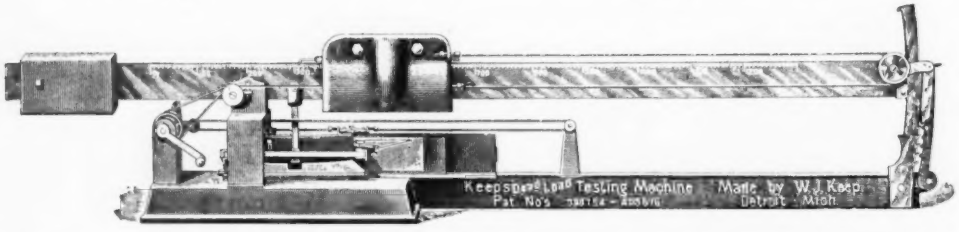
FOR HEAVY MACHINERY CASTINGS?

We guarantee it to Outlast

Any other **Molding Sand** on the Market. **Economy** is the chief element of success in your business at the present time. Give us a trial. Remember, we also furnish **McHenry, St. James, Newport, Centerton, . . . Wanatah and Albany Molding Sand** and all kinds of **Core Sand, Fire Brick, Cupola Blocks, etc.**

The Garden City Sand Co., SUITE No. 1203 SECURITY BUILDING CHICAGO

"Keep's Test" Apparatus.



HERE IS WHAT ONE LARGE CONCERN SAYS:-IT HAS PAID THEM, WHY NOT YOU?

DETROIT, MICH., March 31st, 1896.

Mr. W. J. Keep, City:

DEAR SIR: We have regulated our foundry mixture by "Keep's Test" during the past year, and can recommend it in highest terms. We know exactly what we are doing and can keep our castings of uniform quality. We find that .160 inches per foot the best shrinkage, and have been able to keep the average strength of a test bar ½ inch square and 12 inches long at 450 pounds.

Very truly yours,
LELAND & FAULCONER MFG. CO.,
H. M. LELAND, Vice-President.

TO SAVE MONEY IN YOUR OWN FOUNDRY, ADDRESS **W. J. KEEP, Detroit, Mich.**

Some of Our Specialties.

East India Plumbago,
MOLDERS' TOOLS.
India Silver Lead,
RIDDLES.
Perfect Core Wash,
SHOVELS,
Heavy Stove Plate Facing,
BELLOWS,
Return Stove Plate Facing,
BRISTLE BRUSHES,
Heavy Machinery Facing,
STEEL WIRE BRUSHES,
Car Wheel Facing,
SPRINKLING POTS,
Pipe Blacking,
WHEELBARROWS,
Core Compound,
LADLES,
Cream Soapstone Facing,
FOUNDRY BUCKETS,
Selected Charcoal Facing,
PATTERN LETTERS,
Ice Machine Charcoal,
SNAP FLASKS,
Sea and Stone Coal Facing,
CHAPLETS,
TALC,
(FRENCH, ITALIAN or AMERICAN.)

We shall be pleased at any time to help you in solving questions relating to your foundry practice. We manufacture and handle such a . . . variety of foundry supplies that this space does not afford sufficient room to enumerate them all. If there is anything you want and don't see it in our ad, ask us for it . . . . . .

THE S. OBERMAYER CO
CINCINNATI, O., and CHICAGO, ILL. . . Factories at LARIMER, PA., and WHITE HAVEN, PA. .

ESTABLISHED 1855.

Brass Molding Sands

Thirty-five years' experience in digging, warrants our recommending . . . . . .

OO Crescent and Albany Sand

of different degrees of fineness (according to the work) as the best in the market . . .

Philadelphia Fine Sand

For Chandelier and the finest Brass Work, has a reputation known all over the country, and when sieved through a No. 60 Parting Riddle, makes the finest facing sand known . . .

French Statuary Sand

We import direct and always . . have a stock on hand. It is packed in casks containing about 800 lbs. We grind it to order.

Also, Different Kinds of Core Sand

Our sands are shipped direct . from banks or storehouse, as per . . agreement, in boatloads, carloads, ton or barrel . . .

J. W. Paxson Co.

Pier 45 North,
PHILADELPHIA, PA.

DIXON'S
Black Lead
CRUCIBLES.

BLACK LEAD crucibles were first made by Joseph Dixon in 1827. They at once became the standard at home and abroad, and are to-day still the standard.

They are made in all sizes, from ¼ lb. to 1000 lbs. capacity.

Specially prepared crucibles for melting different metals.

Expert advice furnished free of charge.

JOSEPH DIXON CRUCIBLE CO.

JERSEY CITY, N. J., U. S. A.

Dixon's Crucibles

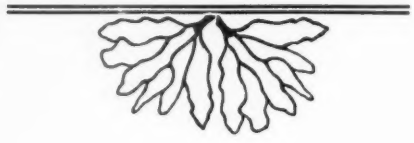
Are made of many mixtures to suit all kinds of work.
Are made special for Steel Melting.
Are made special for Nickel Melting.
Are made special for Brass Melting.
Are made special for Composition Melting.
Are made special for Phosphor Bronze Melting.
Are made special for German Silver Melting.
Are made special for the Melting of Precious Metals.

In ordering, you will be benefitted by mentioning the kind of Metals melted. Write for pamphlet **"How to Use Plumbago Crucibles."** The best are the cheapest, as they must stand the punishment of high heat and much wear and tear. The "Dixon" records in average efficiency, in general good behavior and in volume of sales, far in the lead.

Whitehead Brothers Company,

DEALERS IN

Molding Sand



FIRE SAND,
PHILADELPHIA SAND
FRENCH SAND,
FIRE CLAY, KAOLIN,
FOUNDRY FACINGS
and SUPPLIES
OF ALL KINDS.
LEAD FACINGS
A SPECIALTY.

Albany Sand for Brass and Stove Plate Castings.

537=39 West 27th St.,
NEW YORK.

Providence Office,
42 S. Water Street.

Buffalo Office,
70 and 72 Columbia St.

WORKS AT

CHEESEQUAKE CREEK, N. J.
SOUTH RIVER, N. J.
RARITAN RIVER, N. J.
SOUTH AMBOY, N. J.
WAREHAM, MASS.
CENTRE ISLAND, L. I
WATERFORD, N. Y.
ALBANY, N. Y.
CEDAR HILL, N. Y.
COXSACKIE, N. Y.
CLINTON POINT, N. Y.
ATHENS, N. Y.
COEYMANS, N. Y.
WILLOW SPRINGS, N. Y.
POUGHKEEPSIE, N. Y.
CRESCENT, N. Y.

Established 1872. Incorporated 1895.

McCullough-Dalzell Company

PITTSBURGH, PA.

CRUCIBLES for Brass Melting .

CRUCIBLES for Steel Melting .

CRUCIBLES for All Purposes . .

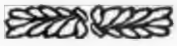
CRUCIBLES of All Sizes . . .

STOPPERS, Twenty-one Styles .

LIDS, COVERS, CAPS, . . .

PHOSPHORIZERS . . . .

PLUMBAGO FINE DUST . . .



ALL ARTICLES CONTAINING PLUMBAGO

Crucible.

ROBT. J. TAYLOR & SON

COR. 19th & CALLOWHILL ST. TRADE MARK. PHILA.

Crucible

Dipper.

Cover.

Stopper.

Crucibles

For melting Steel, Brass, Copper, Gold, Silver, Nickel and Metals and Alloys of Every Description; SmallCrucibles for making Assays and fine pure Plumbago for lubricating, etc.

We are practical workmen and have studied the requirements of the different metal works in this country, as well as in Europe. We also work strictly by chemical analysis, giving a uniformity at all times never before approached in this or any other country.

We make All Sizes, from 8 oz. to 2 ton Capacity.

ROBT. J. TAYLOR & SON,

1900 to 1916
CALLOW HILL STREET, PHILADELPHIA, PA.

We Guarantee..

That one man with one of our **PNEUMATIC HAMMERS** can do more and better work than four men working in the ordinary way.

These same Hammers are also especially adapted for calking boilers and beading flues.

We also manufacture the best Air Drill on the market, and our Air Hoist and Compressors are especially designed for foundry work.

All tools sent on ten days' trial, subject to approval and are guaranteed for one year.

Chicago Pneumatic Tool Co.,

635 Monadnock Building, **CHICAGO, ILL.**

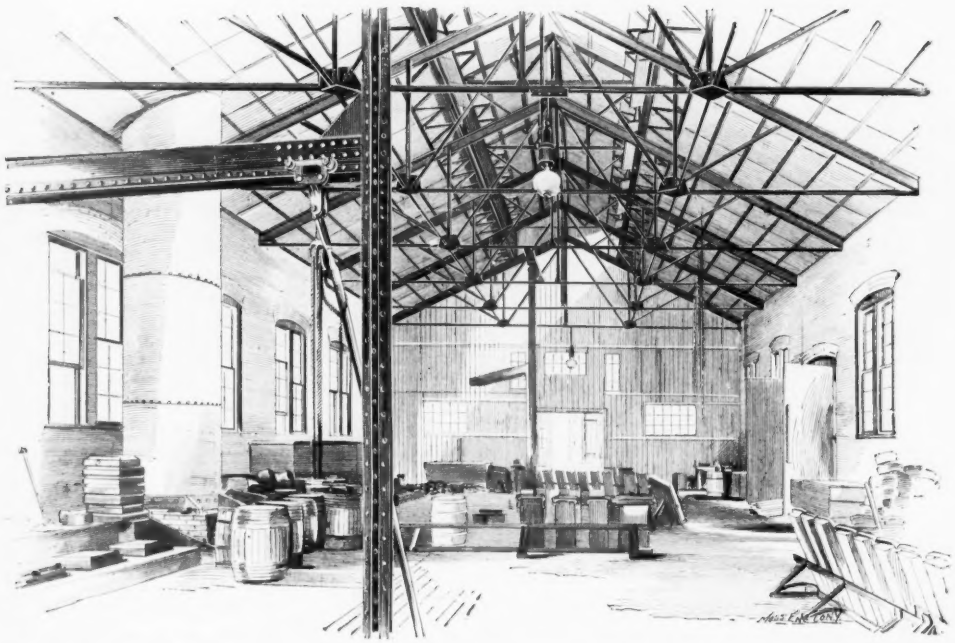
CHAS. M. JARVIS, President. BURR K. FIELD, Vice-President
GEO. H. SAGE, Secretary F. L. WILCOX, Treasurer.

THE BERLIN IRON BRIDGE CO.,

ENGINEERS, ARCHITECTS

—AND BUILDERS OF—

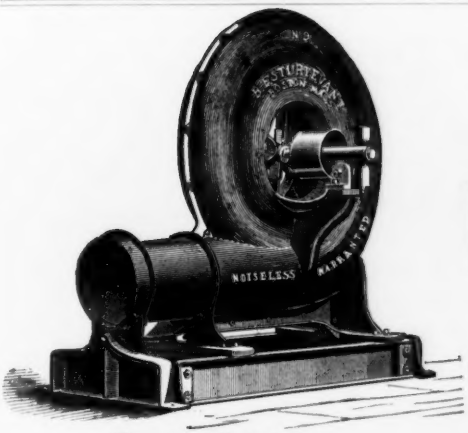
Iron and Steel Bridges, Roofs and Buildings.



The above illustration is taken direct from a photograph and shows the interior of a Brass Casting shop desig ed and built by us for Randolph & Clowes, Waterbury, Conn. The building is 42 feet in width by 83 feet in length, with brick walls and iron truss roof covered with our Patent Anti-Condensation Corrugated Iron Roofing. The danger from fire in a casting shop is very great, hence an iron roof is almost a necessity, but corrugated is not adapted for this class of work, owing to the condensation from the under sides. We guarantee no condensation from a corrugated iron roof constructed under our patent.

Office and Works, - - EAST BERLIN, CONN.

SEND FOR ILLUSTRATED CATALOGUE.



Blower on Adjustable Bed.

THE STURTEVANT STEEL Pressure Blowers,

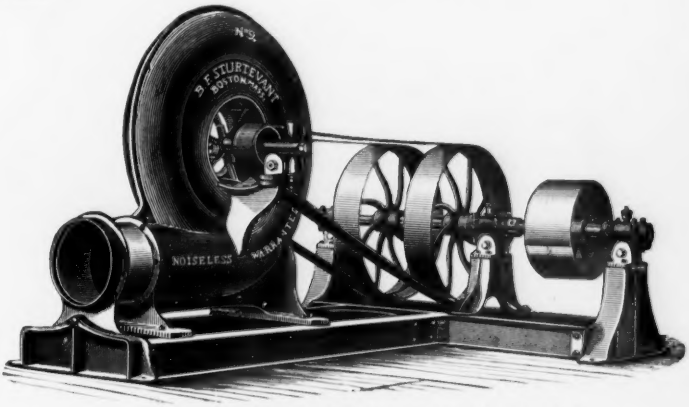
—FOR—

Cupola Furnaces and Forge Fires.

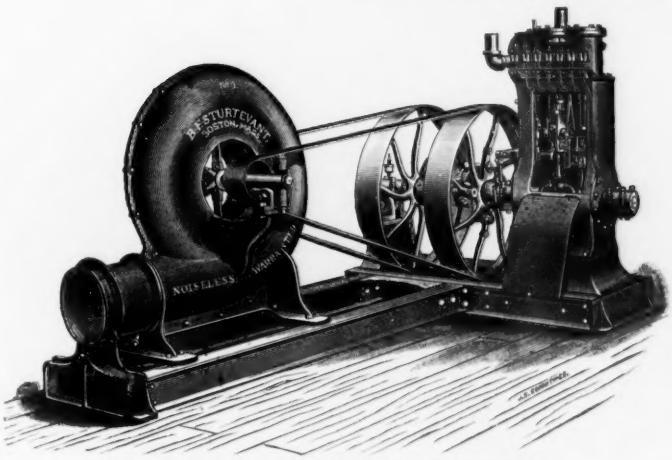
BLOWERS

Furnished without Bed with Separate Countershaft

BLAST GATES



Blower on Adjustable Bed with Combined Countershaft.



Blower on Adjustable Bed with Double Enclosed Engine.

BLOWERS

WITH

THE STURTEVANT

Direct Connected

Electric Motors

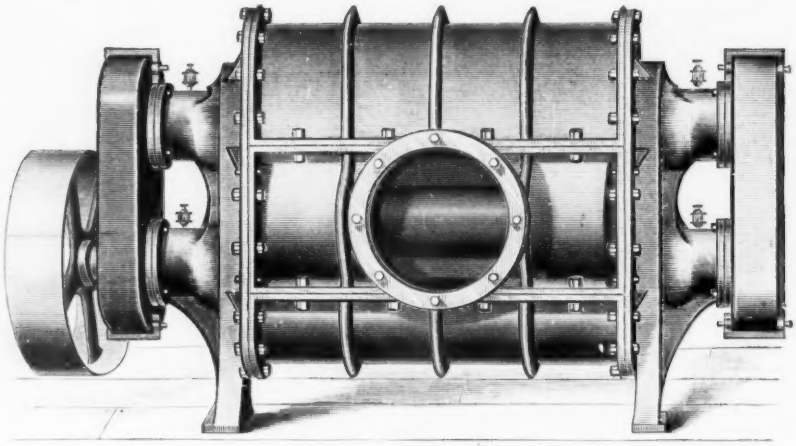
Send for Catalogue.

B. F. STURTEVANT CO.,

BOSTON, MASS.

131 Liberty Street, NEW YORK. 135 N. Third St., PHILADELPHIA.
16 S. Canal St., CHICAGO. 75 Queen Victoria St., LONDON.
STOCK CARRIED AT BRANCHES.

The Green Rotary Pressure Blower



Working parts are two perfectly balanced impellers, mounted on the best steel shafts, running in bronze bushes, cut gearing at both ends of the Blower enclosed in oil-tight casing.

Weighs less, occupies less space, costs less for freight than any other POSITIVE BLOWER in existance.

FOUNDRY BLOWERS

High Pressure Blowers

GAS EXHAUSTERS

Exhausters for Hot Gases

The GREEN Gives the Most Value for a $.

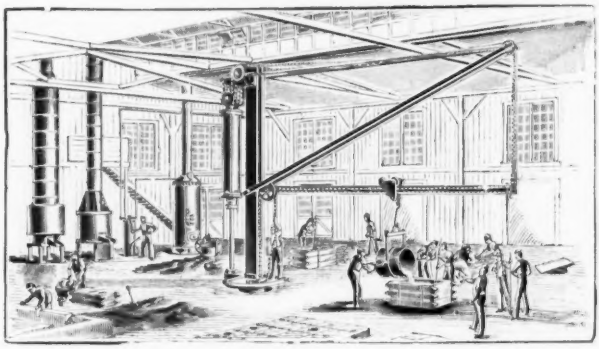
Wilbraham Baker Blower Co.,

2518 Frankford Ave., PHILADELPHIA, PA.

R.G.COCHRAN, President
JNO.H.WYATT, Secretary
J.R.LAUGHREY, Treasurer
J.S.BEWMYER, Manager.
COAL MINES & COKE WORKS
On Pittsburg & Lake Erie Railroad
GENERAL OFFICE
Dawson, Pa.
SALES OFFICE
Pittsburg, Pa.
WASHINGTON COAL & COKE CO.
CAPITAL PAID UP $250,000.00.
Youghiogheny Coal · High Grade Coke
INDIVIDUAL CARS.
DAWSON, PA.
N.P.HYNDMAN, Sales Agent
PITTSBURG, PA

Hire a Giant for "Wittles and Clothes."

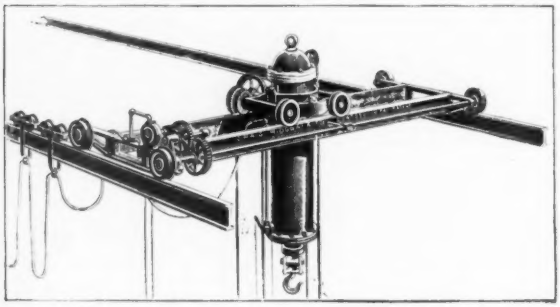
If a great big fellow would come along and offer to work for you and do all your heavy lifting without pay, for just his keep, how quick you would hire him. Well, here's the Ridgway Crane. You can buy it as a man used to buy a slave. It will eat so little of your steam you will never miss what is used, and the way the work will be done will be the greatest surprise of your life. No slow winding business. No complicated machinery, clutches and gears and all that rattletrap; but the simplest machine you ever had to do with. Not only simple, but good. We are placing these cranes in the best plants all over the land, and as business revives, the inquiries and orders that roll in indicates that lots of other plants are going to have them, too. How is it with you; are you going to limp along with your old, behind the times, slow moving, time and men killing cranes, or are you going to investigate a little and find out which is the best and get it and make yourself some money by doing your work quicker.



5-ton Steam-Hydraulic Crane in a Foundry.

Air Hoists. They Can't Jump.

Maybe you like a jumping Air Hoist? If you do, you shouldn't get a Ridgway Oil governed machine. Ridgway Hoists have a little Oil in the piston rod and they can't jerk or jump. The biggest and best foundries are getting them. You get a sample machine, hang it up and try it, and then you will want all the other hoists you have changed over. While you are getting hoists, get the best; they last forever and are a permanent fixture, so that it pays to get only the best. Send for circular and post yourself about this hoist.



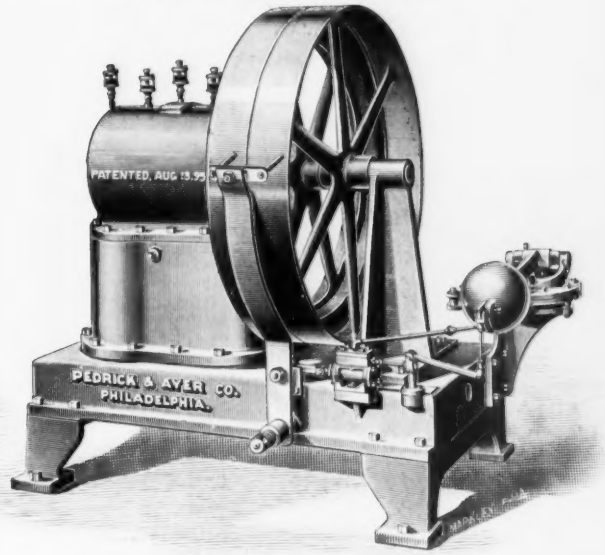
"PLEASE TAKE THE ELEVATOR."

It's the machine for your purpose, and
we make lots of them.

CRAIG RIDGWAY & SON, COATESVILLE, PA.

Automatic Compound Belt Air Compressors.

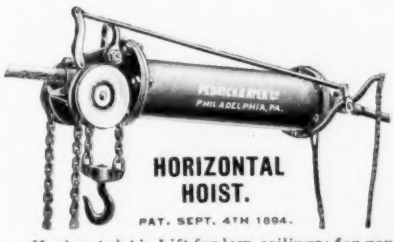
PATENTED AUGUST 13TH 1895.



Straight Lift Hoist.

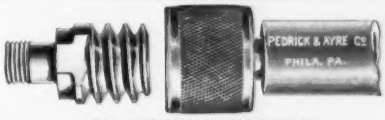
Built in two sizes, Nos. 1 and 2.

No.	Size of Cylinders in inches	Revolutions per Minute.	Cubic Feet of Free Air	Horse Power Required.	Size of Pulleys in inches	Shipping Weight of Compressor	Floor Space in inches	Telegraphic Symbol
1	11X 6 6X 6	100-100	32- 50	2-3½	40x5	2875 lbs.	60x40	Parian
2	13x10 8x10	90-120	90-120	9-15	60x6	5370 lbs.	76x60	Parish



HORIZONTAL HOIST.

PAT. SEPT. 4TH 1894.



AIR HOSE COUPLING

For ½ inch, ¾ inch and 1 inch Hose.

These Compressors will compress more air at less cost than any other make, requiring no attention other than oiling; entirely automatic in action, stopping and starting as air is required. Specially adapted for foundry use. Can be run in series, if so, no stoppage impossible.

Horizontal Air Lift for low ceilings; for general lifting, quick in action and under perfect control of operator.

Straight Air Lift for foundry purposes when equipped with retaining and releasing valve, will hold the load whether heavy or light, in the desired position, as in case of lifting a ladle of molten iron and pouring it or raising a flask to knock out the sand. It can neither ascend or decend as long as connected to air supply.

Air Hose Couplings are designed to do away with long lines of hose. By having suspended along the air line a number of hose equipped with this device, connections can instantly be made or disconnected, allowing one hoist to serve in several places. Each size made in duplicate. Containing a shut-off valve.

Send for circulars and details to Pedrick & Ayer Co., Pneumatic Department.

PEDRICK & AYER CO.

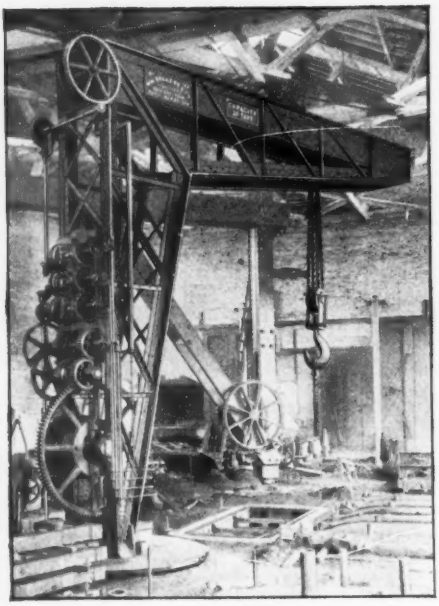
SPRING GARDEN STATION, PHILADELPHIA, PA.

Manning, Maxwell & Moore, *Sole Agents*, 11-113 Liberty St., New York City. 60 South Canal St., CHICAGO, ILL. 424 Telephone Bldg., PITTSBURG.

William Sellers & Co., Incorp.

PHILADELPHIA.

MODERN FOUNDRY MACHINERY



In connection with our Machine Tool Business, we conduct a large foundry where practical tests are continually made of new labor-saving devices. The manufacture of

IMPROVED FOUNDRY CRANES

has become an important feature.

The accompanying illustration shows a quick-acting 30-ton Steam Jib-Crane, erected in the foundry of J. Morton Poole Co., Wilmington, Del., superceding old wooden cranes, one of which appears in the background.

This crane is driven by independent 8" x 8" engines. The platform levers are near the floor. The effective radius of hook is 23 feet.

In future issues of this magazine, we will show illustrations of Jib and Traveling Cranes operated by electric motors.

Centrifugal Sand Mixer

Since the introduction and favorable reception of this effective, expeditious and economical **machine for preparing sand for molds and cores** we have simplified its construction and cheapened its cost. The capacity of the machine is remarkable, being limited only by the facilities for feeding sand into the hopper. Two men will easily shovel 5 tons an hour into the machine.

The qualities of "toughness" and "porosity" are materially improved by this process of preparing molding sand.

Over 10,000 in Use.

ALWAYS READY!

800 TO 2000 CANDLE POWER.

ESPECIALLY ADAPTED FOR

FOUNDRIES

PORTABLE, SELF-CONTAINED, AUTOMATIC.

NO SMOKE! NO SPRAY! NO SHARP SHADOWS!

Now in Valuable Use With Hundreds of Foundries

In addition to 400 Railroads and over 300 Contractors.

REQUEST CIRCULARS FROM

THE WELLS LIGHT M'F'G. CO.

EDWARD ROBINSON, Sole Proprietor.

44-46 WASHINGTON STREET, NEW YORK.

ROSS-MEEHAN FOUNDRY CO.,
CHATTANOOGA, TENN., May 5, '90.

The Wells Light M'f'g. Co., Nos. 44 and 46 Washington St., New York City:

GENTLEMEN—It is contrary to our rule to give testimonials, but an article with the merit of your Wells Light deserves to be made an exception. We have used your lights for the past five years, and consider them indispensible to us.

Yours very truly,
ROSS-MEEHAN FOUNDRY CO.
P. A. BRAWNER, Jr., Sec'y. & Treas.

Powellton Coke

• • •

Fulton's Table Exhibiting the Physical and Chemical Properties of Coke.

		Connell-ville.	*Powellton.*
Grammes in one cubic inch,	Wet,	23.67	22.93
	Dry,	15.47	14.16
Pounds in one cubic foot,	Wet.	87.24	87.33
	Dry,	58.98	53.88
Percentage by volume,	Coke,	49.96	46.48
	Cells,	50.04	53.52
Compressive strength per cubic inch ($\frac{1}{4}$) ultimate strength		301	381
Height of furnace charge supported without crushing,		120	152
Order in cellular space		1	1½
Hardness		3.5	3.0
Specific gravity		1.89	1.86

ANALYSIS.

Fixed Carbon	87.46	91.048
Moisture	0.49	0.117
Ash	11.32	7.548
Sulphur	0.69	0.626
Phosphorus	0.029	0.007
Volatile Matter	.011	0.661

AVERAGE OF FOUR TESTS.

(Signed) JNO. FULTON, E. M.

Chemical Analysis by Prof. Andrew S. McGreath.]

The Mount Carbon Co. Ltd.

Powellton, W. Va.

DIRECTORY OF LEADING PIG IRON DEALERS.

HUGH W. ADAMS & CO.

Pig Iron Merchants

15 Beekman Street, NEW YORK

Boston Office, 85 Water Street

MATTHEW ADDY & CO.

CINCINNATI, ST. LOUIS.

Agencies,

Chicago, Detroit, New York,

Philadelphia. Pittsburg.

CLINTON IRON & STEEL CO.

Manufacturers of the

CLINTON INSPECTED FOUNDRY IRON

CELEBRATED "CLINTON" SOFTENER

PITTSBURG, PA

15 Cortlandt St., NEW YORK.

THE DOMHOFF & JOYCE CO.

PIG IRON-COKE.

CINCINNATI

F. A. GOODRICH & CO.

Incorporated

PIG IRON, STEEL, COKE, ETC.

Detroit, Mich.

M. A. HANNA & CO.,

COAL, IRON ORE
and PIG IRON.

Cleveland, Ohio.

THOMAS A. MACK,

PIG IRON.

Cincinnati, - - Ohio.

PICKANDS, BROWN & CO.,

Manufacturers, Importers
and Dealers in

PIG IRON AND IRON ORE.

Rookery Building, CHICAGO.

PICKANDS, MATHER & CO.,

PIG IRON.

Cleveland, Ohio.

PILLING & CRANE,

PIG IRON and COKE.

Carnegie Building,
PITTSBURG, PA.

Girard Building,
PHILADELPHIA, PA.

ROGERS, BROWN & CO.

CINCINNATI, CHICAGO,

BUFFALO,

PHILADELPHIA, NEW YORK,

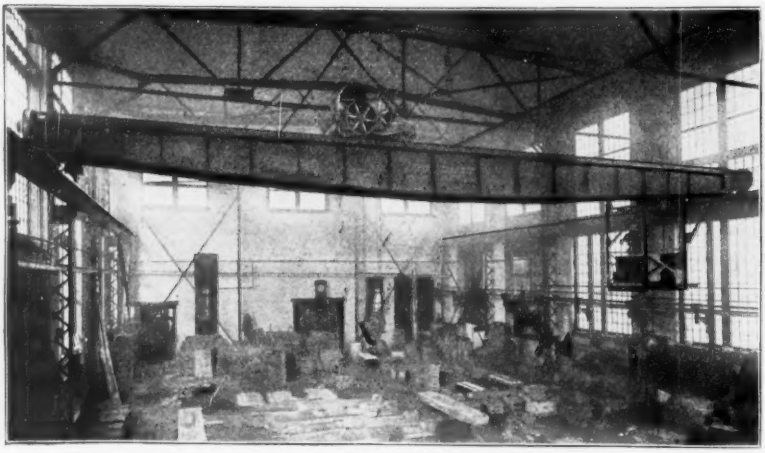
ST. LOUIS

STEVENSON, FIELD & CO.

PIG IRON and COKE.

Columbus, O. St. Louis, Mo.

Vanderbilt Bldg., New York.



50-FOOT SPAN ELECTRIC THREE MOTOR CRANE.

Whiting Foundry Equipment Co.

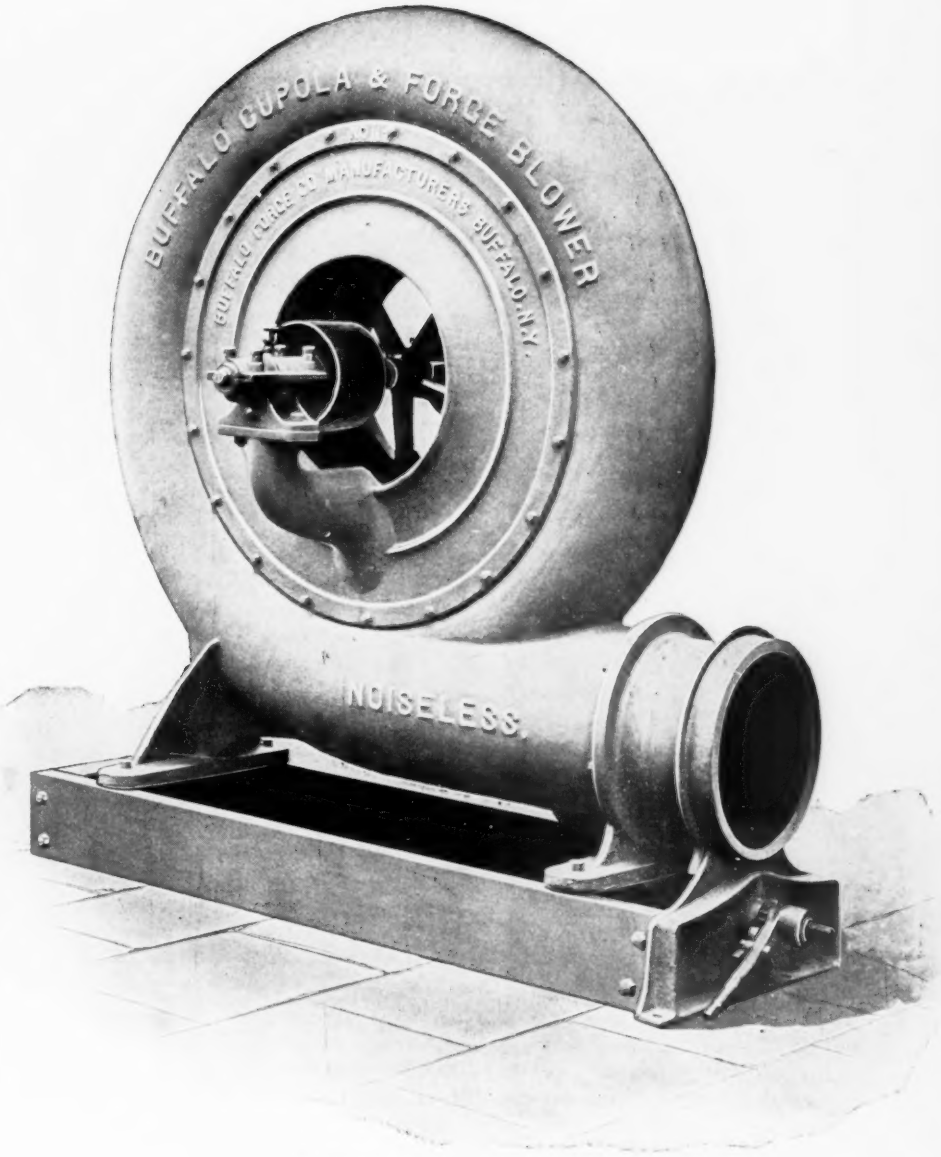
Works, HARVEY, ILL. (Chicago Suburb.)

No modern foundry should be without modern cranes. They can be either Electric, Compressed Air, Belt or Hand Power and still be modern if designed for the place and the duty. Prices, catalogues or photos on request . . . . . :

There are more WHITING CUPOLAS being sold now than ever before. The standard cupola for all classes of foundry work. Get prices.

LADLES, TRUCKS, TUMBLERS, TURNTABLES.

SEND FOR CIRCULAR.



A BUFFALO BLOWER ENOUGH SAID.

FOUNDRY LIGHTING.

The Only Light that will penetrate Smoke and Steam arising from the molds . . . .

❋

The BUCKEYE Coal Oil Arc Lamp gives a Light equal to Two Electric Arc Lamps.

❋

IS PORTABLE.

❋

Complete in Itself.
Can be moved to Suit the Work.
Flame Can be
Vertical or Horizontal as Desired.

❋

SIMPLE, EFFICIENT AND LOW COST OF MAINTAINANCE.

☞See Notice on Page 143 for a full Description.
Send for our Prices to

MACLEOD & CLARK

457-463 E. Front St., CINCINNATI, O.

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The only foundry paper published in the world, and an authority on all matters pertaining to the foundry business.

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The adjustment is in the Track and not in the Hanger, as are others.

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Impossible for door to jump the track. Very simple and cheap to apply.

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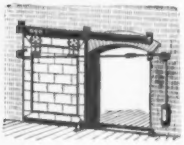

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The Universal Liquid Core Compound

Patented in the United States, England, France and Belgium.

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It is cheaper and better than flour, rosin, oil or any other compound in use; takes the place of all other materials and never varies in quality.

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The cores come out easily and leave the castings smooth.

Will let the air and gases off from a core which is difficult to vent better than any other material in use and makes no offensive smell or smoke.

WILL NEVER BLOW THE CASTINGS.

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Sole Manufacturers.

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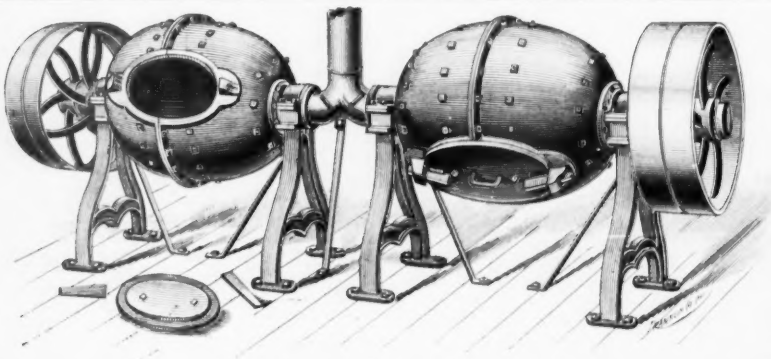

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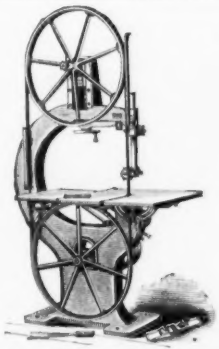

31 in. and 36 in. Band Saw Machine.

... Complete Outfits ...

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STRICTLY FIRST-CLASS TOOLS.

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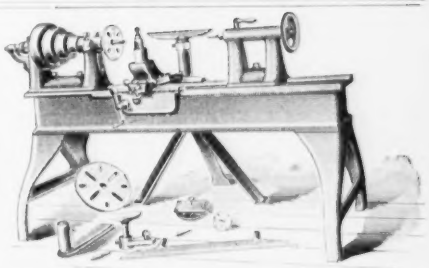

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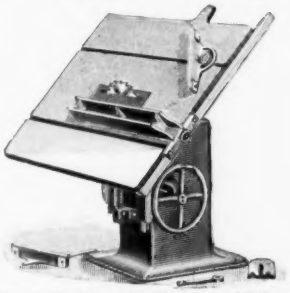

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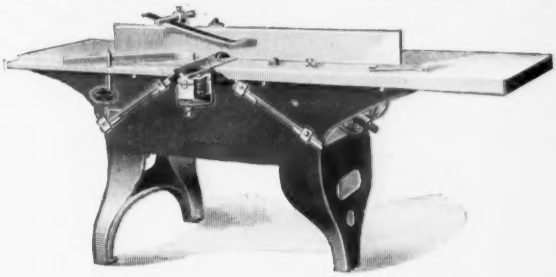

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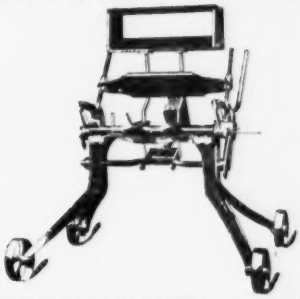
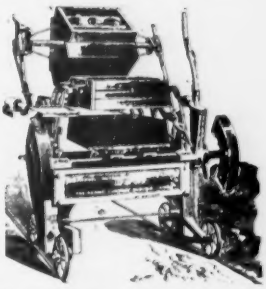
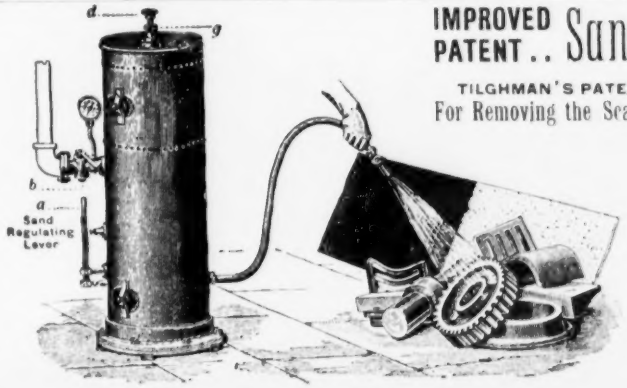




THE ADAMS COMPANY, DUBUQUE, IOWA



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TILGHMAN'S PATENTS MATHEWSON'S PATENTS.

For Removing the Scale from Iron and Steel Plates.

Cleaning Castings, Forgings, etc

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SOLE AGENTS.

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Exclusive Dealers in the following well known brands of

ANTRIM, ELK RAPIDS,
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Lake Superior Charcoal Pig Iron

All business connected with the sale of the above brands of Charcoal Pig Iron will, from April 1st, 1897, be handled by **The Superior Charcoal Iron Co.**, of Detroit, Mich., which is thus enabled to supply the best iron known for all purposes, and especially for Car Wheels, Malleable Castings, Boiler Tubes, Ship and Armor Plate, Strong High Silicon for Foundry purposes, Basic Iron with the minimum of Silicon and Sulphur, also Iron to take the place of Salisbury, Southern and Swedish Charcoal Iron.

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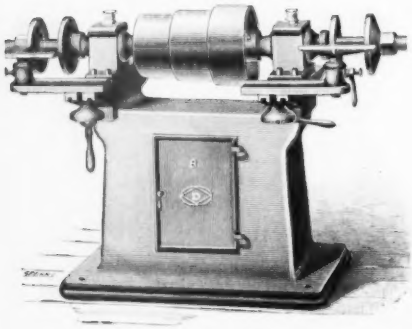

No. 8 GRINDER.

If you want a

Big, Heavy Grinder

For foundry work, here it is. We also have smaller and larger sizes. Our catalogue No. 19 tells all about them.

DIAMOND MACHINE CO. Providence, R. I.

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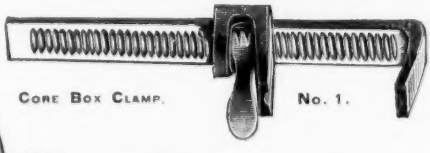

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Write for Prices and Discounts.

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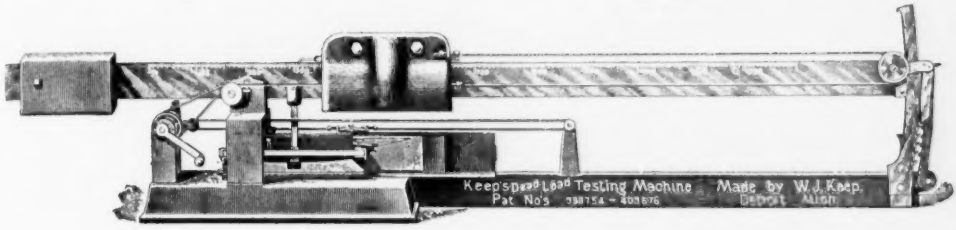

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DEAR SIR: We have regulated our foundry mixture by "Keep's Test" during the past year, and can recommend it in highest terms. We know exactly what we are doing and can keep our castings of uniform quality. We find that .160 inches per foot the best shrinkage, and have been able to keep the average strength of a test bar ½ inch square and 12 inches long at 450 pounds.

Very truly yours,
LELAND & FAULCONER MFG. CO.,
H. M. LELAND, Vice-President.

To SAVE MONEY IN YOUR OWN FOUNDRY, ADDRESS **W. J. KEEP, Detroit, Mich.**

Clinton Iron & Steel Co.

"FAIR DEALING" Their Motto.

MANUFACTURERS OF

"CLINTON" AND "HECTOR"

INSPECTED FOUNDRY IRONS . . . . .

ALSO

Sole Factors for DUNBAR STRONG IRON

In New York and New England.

FURNACES, PITTSBURGH.

NEW YORK OFFICE, No. 15 Cortlandt St.

Why deal with Commission people or Agents who give fancy names to Irons and know nothing about their manufacture.

DEAL WITH THE MANUFACTURER DIRECT.

Look at the Wood We Burn into . . **CHARCOAL**

NO WONDER OUR

CHARCOAL FACING

is used in so many Brass and Stove Foundries.

LET US TALK IT OVER WITH YOU.

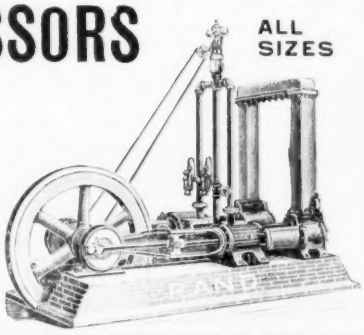
Springfield Facing Co. SPRINGFIELD MASS

RAND AIR COMPRESSORS

FOR FOUNDRIES.

SIMPLE. DURABLE. ECONOMICAL.

Our **Duplex Compressor,** Campound Air Cylinders, with Inter-Cooler and Compound Steam Cylinders, with Meyer Cut-off Valves, is the best construction for small and medium sizes.



RAND DRILL CO.

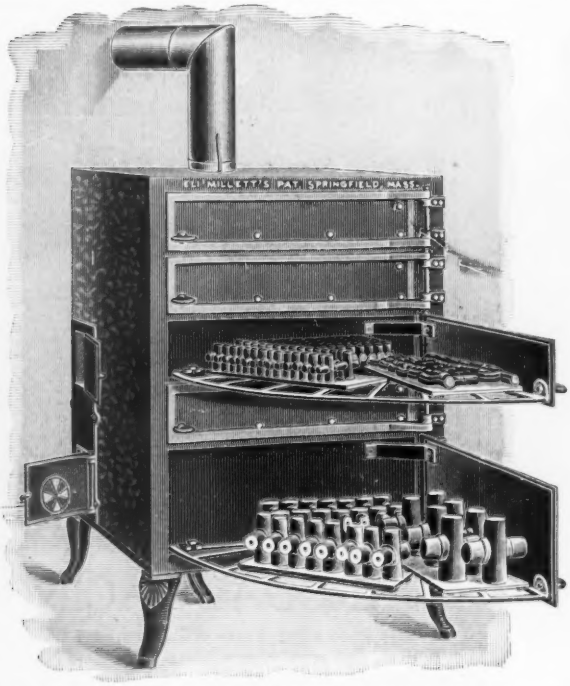
Don't forget our Rock Drills. 100 Broadway, NEW YORK.

THE MAN

Who aspires to become something else besides a carrier of iron, will educate himself for something better. **"Metallurgy of Cast Iron"** is written for people who don't know it all. As a help in the practical operation of foundries, its value can only be known after a thorough reading.

"Metallurgy of Cast Iron"

Price $3.00, Postpaid. THE FOUNDRY PUB. CO., DETROIT, MICH.



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THE BEST IN THE WORLD.

No Foundry using small Cores can afford to be without it.

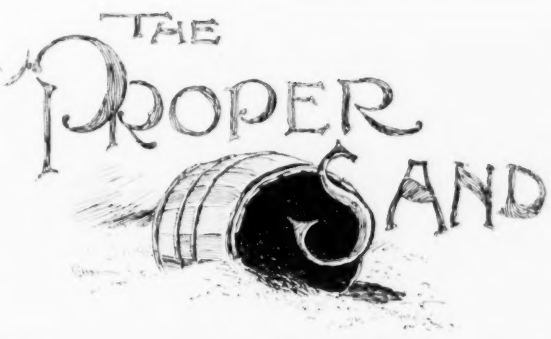
Over one hundred and fifty in use.

Send for our new Catalogue giving names of those using them.

Millett Core Oven Co.

BRIGHTWOOD, MASS.

For Sale by THE J. W. PAXSON CO., Philadelphia, Pa., and THE S. OBERMAYER CO., Chicago, Ill.



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Riverdale Molding Sand

FOR HEAVY MACHINERY CASTINGS?

We guarantee it to Outlast

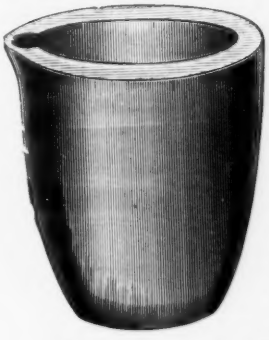
Any other **Molding Sand** on the Market. **Economy** is the chief element of success in your business at the present time. Give us a trial. Remember, we also furnish **McHenry, St. James, Newport, Centerton, . . . Wanatah and Albany Molding Sand** and all kinds of **Core Sand, Fire Brick, Cupola Blocks, etc.**

The Garden City Sand Co.,

SUITE No. 1203 SECURITY BUILDING
CHICAGO

WE MANUFACTURE

PLUMBAGO CRUCIBLES



FOR MEN THAT

UNDERSTAND

using them and then they cannot be surpassed in durability; 90 heats have been attained from one crucible. Send for testimonials, quantity and sizes wanted, and we will quote you figures.

Ceylon Plumbago

PURE and HEAVY, is the only material for FACINGS if you want a bright smooth casting or for a Lubricant or Stove Polish, etc.

We keep it for sale.

Hussman Crucible Co.

ST. LOUIS, MO

Eberhardt's Patented Sprue or Gate Cutter

Dear Sir:—The machine fills the bill; am just delighted with it.
Yours truly,
Maryland Brass & Metal Works,
Baltimore, Md.

Price Low

Send to

GOULD & EBERHARDT, NEWARK, N. J.

Foundrymen

. . . Are getting too well posted.
. . . The day has gone by when they will accept almost anything
. . . . . for Plumbago just because it looks like it.
. . . If you really want your castings nice, advise us as to their
. . . . . character and let us send you sample.
. . . No high-sounding, catchy names to our goods.
. . . We simply call them what they are.
. . . The name will not peel the casting or make it better.
. . . Results only count.

T. P. Kelly & Company

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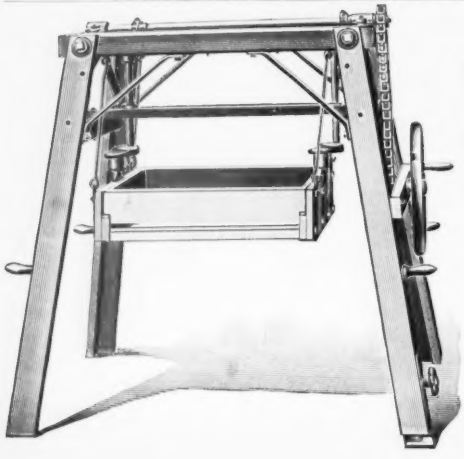
WESTERN OFFICE and MILLS,
121-127 North Ada Street, Cor. Kinzie, CHICAGO.

We make patterns cheaper, better and in a fraction of the time required to get them out elsewhere. Do you realize that a small pattern shop is a nuisance? It is either a feast or a famine all the time. The Gobeille Pattern Co., Cleveland, Ohio.



THE PERFECT

Sand Riddling Machine

This is the Best, Simplest, Cheapest, Most Durable and Most Easily Operated Sand Riddling Machine made.

For full particulars and references, address,

THE SPRINGFIELD FOUNDRY CO.
SPRINGFIELD, OHIO.

You can get anything wanted AT THE

FOUNDRY SUPPLY DEPOT

OF

J. S. McCormick Co. PITTSBURG, PA.

FOUNDRY MOLDING MACHINES,
STRIPPING PLATE MACHINES,
PORTABLE, AIR-POWER, MACHINES,

USING WOOD OR METAL SPLIT PATTERNS, WITHOUT STRIPPING PLATES.

Write for information.

The Tabor M'f'g Co.,

ELIZABETH N. J.

ESTABLISHED 1875.

STOW MANUF'G CO.,

BINGHAMTON, N. Y.

INVENTORS OF THE

FLEXIBLE SHAFT

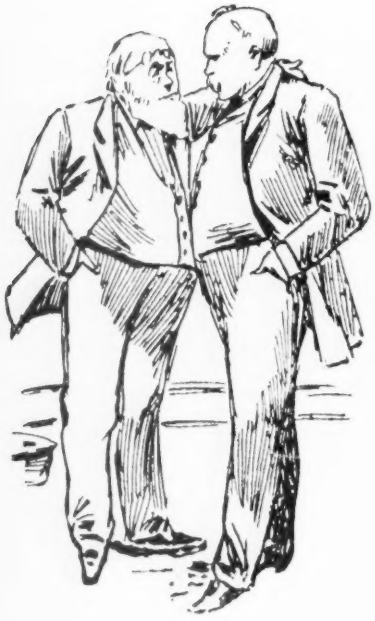
FOR ALL PURPOSES.

The oldest and largest manufacturers in the world

PORTABLE EMERY GRINDER

Take the tool to the work and save heavy handling.

WRITE US FOR CATALOGUE AND PRICES



You remember, in your Sunday School lesson, the story about BELSHAZZER, who when at his feast, filled up with chicken pie, saw the hand writing on the wall "Mene, Mene tekel upharsin"—"Thou art weighed in the balance and found wanting!"

Here is where one of our articles for Foundrymen, differs from Belshazzar—it has never "been found wanting." It stands the racket in Foundries all over the United States. We ship it to Albany, and that is right into the enemy's camp; to Mexico, and a year or so later they call for more. If you line a Cupola, thirty-six inches in diameter, with nine-inch Fire Brick, you will have fifty-eight joints in each circle—fifty-eight chances for Clay to fall out and for heat to work in. If you use our **CUPOLA BLOCK** you have fourteen joints—only fourteen possible chances in one case, fifty-eight in the other. That's a general reason why a Block is better than a Brick. The reason why our **"COLLIAU CUPOLA BLOCK"** is the best is because of the stuff it's made of. It stands expansion and contraction from the heat, at time of melting, and the rapid cooling off which follows. It stands the friction of Scrap and Pig Iron working down; it stands the wear and tear and is the best you can buy. One Cupola Block differs from another, so do watches; it's the "works" that determine the value. The "works" in our **COLLIAU CUPOLA BLOCK** are all right.

Incidently we mention that we have "Everything for a Foundry."

F. B. STEVENS,

COR. GRISWOLD & ATWATER STS. DETROIT, MICH.

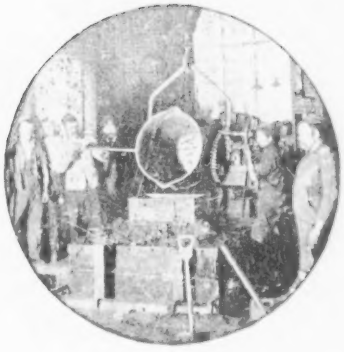
A MERRY XMAS

WE ARE GLAD TO AVAIL OURSELVES OF THIS OPPORTUNITY TO THANK THE FOUNDRY TRADE OF AMERICA FOR THEIR VERY LIBERAL PATRONAGE DURING THE YEAR JUST CLOSING

THIS COULD ONLY BE MADE POSSIBLE BY THE ADOPTION OF THE "OBERMAYER METHOD" OF POSITIVELY GUARANTEEING QUALITY AND SATISFACTION OR NO CHARGE

1897

NOTWITHSTANDING THE GREAT DEPRESSION, WE HAVE SOLD MORE GOODS IN 1897 THAN DURING ANY YEAR OF OUR HISTORY



WE SINCERELY HOPE THAT YOUR XMAS MAY BE JOYFUL AND THAT THE YEAR 1898 MAY PROVE A PROSPEROUS AND HAPPY ONE FOR YOU

The S. Obermayer Co.

CINCINNATI, O.
CHICAGO, ILL.
LARIMER, PA.

The S. Obermayer Co.

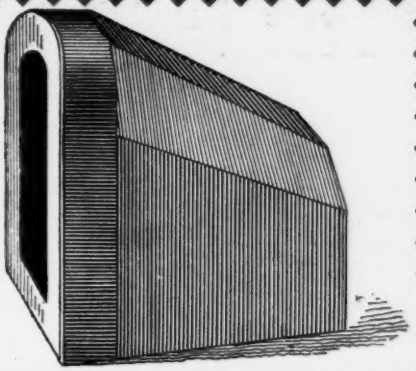
CINCINNATI, O.
CHICAGO, ILL.
LARIMER, PA.
WHITE HAVEN, PA.

THE LARGEST AND
THE STANDARD
FOUNDRY SUPPLY HOUSE
OF THE WORLD.

WE MENTION A FEW FOUNDRY SUPPLIES AND EQUIPMENTS WHICH WE CARRY IN STOCK.

Ceylon Plumbago, India Silver Lead, Founders' Perfect Wash, Heavy Machine Blacking, Heavy Stove Plate Facing, National and Eagle Return Facing, Soft, Hard and Steel Wire Brushes, Brass, Galvanized and Steel Wire Riddles, Bellows, Shovels ($\frac{\text{all}}{\text{grades}}$), Coke Forks, Molders' Tools, Wheelbarrows, Snap Flasks, Pattern Letters, Ladles, Crucibles, Emery Wheels, Sea Coal, Stone Coal, Bituminous Facing, Core Compound, Soapstone, Foundry Flour, Talc, Bolted Cement, Foundry Molasses, Fluor Spar, Stove Putty, Silica, Brass Sand.

ALL GOODS GUARANTEED. TRIAL SAMPLES FREE.



THE Moore Cupola Breast

PATENTED.

The Annoyance

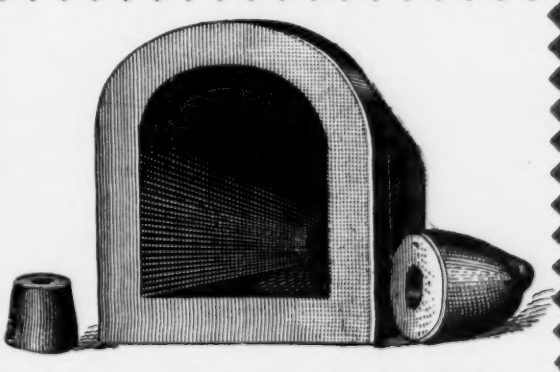
RESULTING from an improperly made Cupola Breast is only exceeded by the loss it occasions. The foreman of one of the large foundries in Philadelphia has devised a Breast made of the same material as Black Lead Crucibles and provided with a patent stopper by which all of the trouble usually experienced around this part of a cupola may be done away with.

No slag will attach itself to either breast or stopper—a great advantage in long heats.

The tapping hole will not wear away and be enlarged like in a breast made of clay. This may save you from several accidents.

A ring or collar is also furnished, by which the size of the tapping hole may be reduced.

Price, complete, per set, $2.00 net.

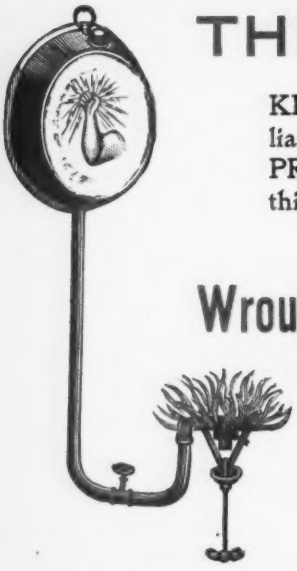


When ordering, state how much iron you melt per hour, so that we can send you a Breast having a tapping hole of the right size.

J. W. Paxson Co

PIER 45 NORTH,
PHILADELPHIA,
PA.

Give your shop plenty of light and Your men will do plenty of work.



THE ELECTRIC

KEROSENE TORCH; just the thing where a large, brilliant and steady light is wanted. Cheap and economical. PRICE, $6.80. ☙ Why use the dangerous Gasoline, when this torch will give a better light from Kerosene?

Wrought Steel Top Burner

Made to withstand the rough use accorded such articles in the foundry.

PRICE, per dozen, $12.50.

Patent Wrought Steel Lamps

with hook, chain and swivel combination. The ideal hand torch for all around use.

PRICE, per dozen, $14.40.

Wrought Steel Lamps

Improved Screw Cap and Chain; practically unbreakable. Get something that will last and you will get along better.

PRICE, per dozen, $13.50.

A LARGE DISCOUNT IS ALLOWED ON THESE LAMPS.
WRITE US FOR FURTHER PARTICULARS.

J. W. PAXSON CO. PIER 45 NORTH, PHILADELPHIA, PA.

DIXON'S
Black Lead
CRUCIBLES.

BLACK LEAD crucibles were first made by Joseph Dixon in 1827. They at once became the standard at home and abroad, and are to-day still the standard.

They are made in all sizes, from ¼ lb. to 1000 lbs. capacity.

Specially prepared crucibles for melting different metals.

Expert advice furnished free of charge.

JOSEPH DIXON CRUCIBLE CO.

JERSEY CITY, N. J., U. S. A.

Dixon's Crucibles

Are made of many mixtures to suit all kinds of work.
Are made special for Steel Melting.
Are made special for Nickel Melting.
Are made special for Brass Melting.
Are made special for Composition Melting.
Are made special for Phosphor Bronze Melting.
Are made special for German Silver Melting.
Are made special for the Melting of Precious Metals.

In ordering, you will be benefitted by mentioning the kind of Metals melted. Write for pamphlet **"How to Use Plumbago Crucibles."** The best are the cheapest, as they must stand the punishment of high heat and much wear and tear. The "Dixon" records in average efficiency, in general good behavior and in volume of sales, far in the lead.

THE STANDARD GRAPHITE OF THE WORLD

PETTINOS BROTHERS.

MINERS AND REFINERS.

"AMERICAN" GRAPHITE, PLUMBAGO, SILVER LEAD.

MANUFACTURERS
Foundry Facings and Supplies.

MINES BYERS, PA.

WORKS,
Byers, Pa., Freemansburg, Pa.

MAIN OFFICE,
BETHLEHEM, PA.
NEW YORK, PHILADELPHIA,
PITTSBURG.

The Best Facing is the Cheapest Facing!

AMERICAN SILVER LEAD (Foliated Graphite) is conceded by all experts to be the **purest, softest** and **most brilliant** in the world. For Crucibles, Lubricants, Foundry Facing, Electrotyping, Paint; in fact, wherever there is exposure to the action of extreme heat, gas or acids, where friction is to be minimized or where a smooth coating with high polish is needed, this is the **only Graphite** that will give **perfect results.**

We Mine, Refine and Sell Direct to the Consumer!

A FOUNDRYMAN, in buying from us, saves the **Middleman's Profit** and is enabled to secure this **unrivalled** product at as low a price as that he pays for the inferior and and adulterated Ceylon grades. We manufacture **Facings** and **Blackings of every description** for **all kinds of work** and will send trial samples **free of charge** and estimates on application. We carry stock in New York, Philadelphia, Pittsburg, Cleveland and Buffalo and can deliver at short notice.

USE

American Graphite Paint

Unequalled for Smoke Stacks, Boiler Fronts, Roofs and for all surfaces exposed to the action of a high degree of heat, steam, acids, gas fumes, etc.

American Graphite Grease

For Loose and Open Bearings, Journals, Wagon, Car or Truck Axles, Tallow Cups, Cables, Elevators, or any Friction Surfaces.

ADDRESS ALL COMMUNICATIONS TO BETHLEHEM OFFICE.

THE RELIABLE :

Foundry . Torch . . Light . . .

will penetrate Smoke or Steam arising from the molds . . . . . .

Specially designed for Foundry Use. Light can be adjusted vertically or horizontally, as desired . . . . . .

Price, complete, $30.00 Net Cash.

Gives a Light equal to 1500 Candle Power.

AUTOMATIC.
PORTABLE.

Can be moved to suit the work. Requires little attention.

READ THIS TESTIMONIAL

FROM THE OFFICE OF
MESSRS. FARRAR & TREFTS, BUFFALO, November 20, 1897.

To Messrs. Macleod & Clark:

DEAR SIRS—We have to say we are very much pleased with the new light, in fact, we like it better than the ————. You have proof conclusive that we like the same or we should not have paid the bill without further trial.

SEND ORDERS TO

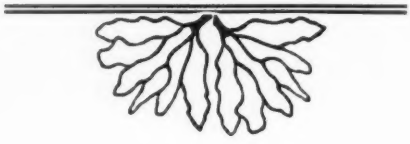
MACLEOD & CLARK Sole Manufacturers

457-463 East Front Street, CINCINNATI, OHIO.

Whitehead Brothers Company,

DEALERS IN

Molding Sand



FIRE SAND,
PHILADELPHIA SAND
FRENCH SAND,
FIRE CLAY, KAOLIN,
FOUNDRY FACINGS
and SUPPLIES
OF ALL KINDS.
LEAD FACINGS
A SPECIALTY.

Albany Sand for Brass and Stove Plate Castings.

537=39 West 27th St.,
NEW YORK.

Providence Office,
42 S. Water Street.

Buffalo Office,
70 and 72 Columbia St.

WORKS AT

CHEESEQUAKE CREEK, N. J.
SOUTH RIVER, N. J.
RARITAN RIVER, N. J.
SOUTH AMBOY, N. J.
WAREHAM, MASS.
CENTRE ISLAND, L. I
WATERFORD, N. Y.
ALBANY, N. Y.
CEDAR HILL, N. Y.
COXSACKIE, N. Y.
CLINTON POINT, N. Y.
ATHENS, N. Y.
COEYMANS, N. Y.
WILLOW SPRINGS, N. Y.
POUGHKEEPSIE, N. Y.
CRESCENT, N. Y.

Established 1872. Incorporated 1895.

McCullough-Dalzell Company

PITTSBURGH, PA.

CRUCIBLES for Brass Melting .

CRUCIBLES for Steel Melting .

CRUCIBLES for All Purposes . .

CRUCIBLES of All Sizes . . .

STOPPERS, Twenty-one Styles .

LIDS, COVERS, CAPS, . . .

PHOSPHORIZERS . . . .

PLUMBAGO FINE DUST . . .

ALL ARTICLES CONTAINING PLUMBAGO

Crucible.

Crucible

Dipper.

Cover.

Stopper.

Crucibles

For melting Steel, Brass, Copper, Gold, Silver, Nickel and Metals and Alloys of Every Description; SmallCrucibles for making Assays and fine pure Plumbago for lubricating, etc.

We are practical workmen and have studied the requirements of the different metal works in this country, as well as in Europe. We also work strictly by chemical analysis, giving a uniformity at all times never before approached in this or any other country.

We make All Sizes, from 8 oz. to 2 ton Capacity.

ROBT. J. TAYLOR & SON,

1900 to 1916
CALLOW HILL STREET, PHILADELPHIA, PA.

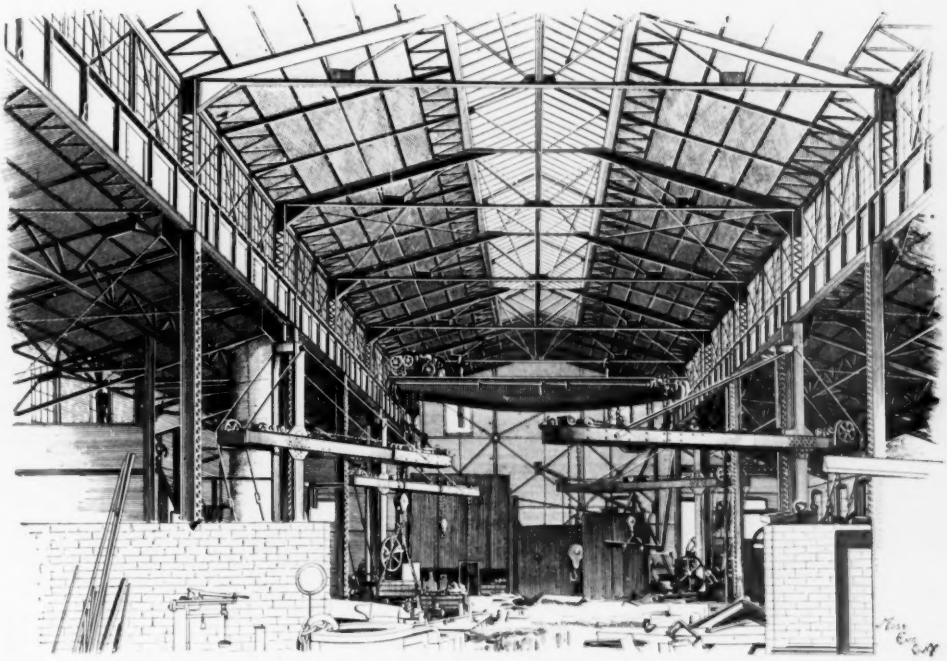
CHAS. M. JARVIS, President. BURR K. FIELD, Vice-President
GEO. H. SAGE, Secretary F. L. WILCOX, Treasurer.

THE BERLIN IRON BRIDGE CO.,

ENGINEERS, ARCHITECTS

—AND BUILDERS OF—

Iron and Steel Bridges, Roofs and Buildings.

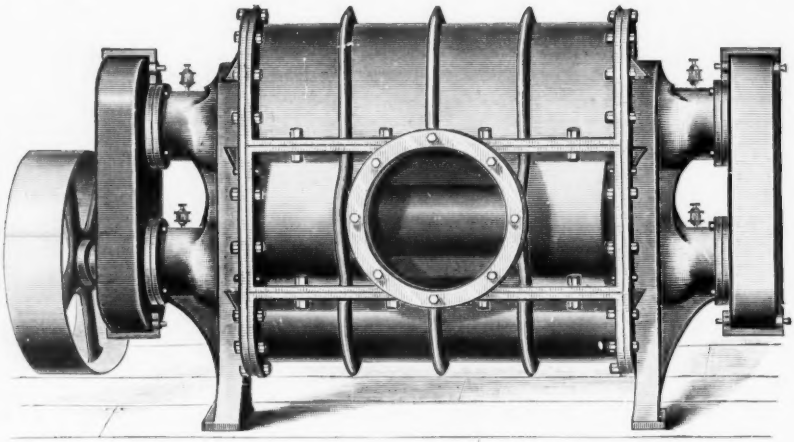


The above illustration is taken direct from a photograph and shows the interior of a foundry building which was designed and built by us for S. F. Hodge & Co., at Detroit, Mich. Each wing is 24 feet in width and the central portion is 40 feet in width, this latter controlled by a crane with a travel the full length of the building. The crane girder posts are designed to carry jib cranes as shown. The roof is covered with our patent Anti-Condensation Corrugated Iron. The building is absolutely fire-proof, and the corrugated Iron roof is guaranteed not to drip in the coldest weather.

Office and Works, - - EAST BERLIN, CONN.

SEND FOR ILLUSTRATED CATALOGUE.

The Green Rotary Pressure Blower



Working parts are two perfectly balanced impellers, mounted on the best steel shafts, running in bronze bushes, cut gearing at both ends of the Blower enclosed in oil-tight casing.

Weighs less, occupies less space, costs less for freight than any other POSITIVE BLOWER in existance.

FOUNDRY BLOWERS

High Pressure Blowers

GAS EXHAUSTERS

Exhausters for Hot Gases

The GREEN Gives the Most Value for a $.

Wilbraham Baker Blower Co.,

2518 Frankford Ave., PHILADELPHIA, PA.

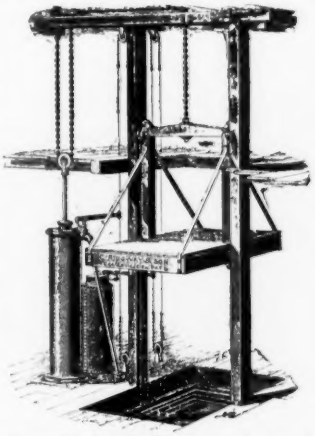
WASHINGTON COAL & COKE CO.
CAPITAL $250,000.00
Youghiogheny Coal · High Grade Coke ·
DAWSON, PA.
INDIVIDUAL CARS.
N. P. HYNDMAN, Sales Agent
PITTSBURG, PA.
COAL MINES & COKE WORKS
On Pittsburg & Lake Erie Railroad
GENERAL OFFICE
Dawson, Pa.
SALES OFFICE
Pittsburg, Pa.
P. G. COCHRAN, President
JNO. H. WURTZ, Secretary
J. R. LAUGHREY, Treasurer
J. B. NEWMYER, Manager

"GOING UP?"

"Confound it! Ridgway, why don't you advertise more in particular about your Steam-Hydraulic Elevator? Here we've gone and wasted a lot of money on this pump driven affair when yours is just what we wanted; is forty times better, costs nothing to run and the price is about one-half!"

Ah, me! and here we've been a yelling steady every week for three years, **"Please Take the Elevator."** What more can a fellow do? You can't publish a treatise on elevators in a page card.

If you are not smart enough to look into a thing that a reliable concern thinks worth while to spend money on in persistent advertising year after year, you deserve all the anguish of remorse.



Steam-Hydraulic Elevator, also made direct acting with cylinder under platform.

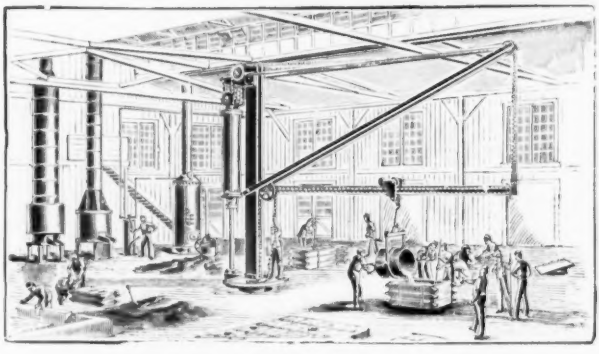
This elevator is the greatest machine ever devised for limited lifts. It is a perfect hydraulic elevator, yet requires no pump. nor city pressure. Is run by your ordinary steam supply and the steam required is too trifling to consider. We are placing them in the best plants everywhere, and every user has only words of praise for them. You may know how perfect they are when we use identically the same thing in our celebrated Steam-Hydraulic Crane for handling great ladles of molten iron and steel where the least irregularity and lack of control would mean death to men and the destruction to property. Don't buy an elevator until you get circulars and prices.

Cranes and Air Hoists.

Our Oil Governed Air Hoist is the best air hoist there is. Try just one and see for yourself.

The Balanced Steam-Hydraulic Crane is the machine with which to hitch your boiler to your heavy loads.

A real smart man will at least investigate for himself. We don't have to buttonhole people.



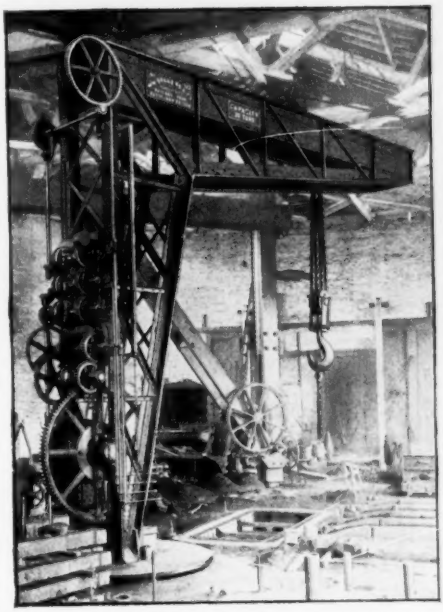
5-ton Steam-Hydraulic Crane in a Foundry.

CRAIG RIDGWAY & SON, COATESVILLE, PA.

William Sellers & Co., Incorp.

PHILADELPHIA.

MODERN FOUNDRY MACHINERY



In connection with our Machine Tool Business, we conduct a large foundry where practical tests are continually made of new labor-saving devices. The manufacture of

IMPROVED FOUNDRY CRANES

has become an important feature.

The accompanying illustration shows a quick-acting 30-ton Steam Jib-Crane, erected in the foundry of J. Morton Poole Co., Wilmington, Del., superceding old wooden cranes, one of which appears in the background.

This crane is driven by independent 8" x 8" engines. The platform levers are near the floor. The effective radius of hook is 23 feet.

In future issues of this magazine, we will show illustrations of Jib and Traveling Cranes operated by electric motors.

Centrifugal Sand Mixer

Since the introduction and favorable reception of this effective, expeditious and economical **machine for preparing sand for molds and cores** we have simplified its construction and cheapened its cost. The capacity of the machine is remarkable, being limited only by the facilities for feeding sand into the hopper. Two men will easily shovel 5 tons an hour into the machine.

The qualities of "toughness" and "porosity" are materially improved by this process of preparing molding sand.

Over 10,000 in Use

ALWAYS READY!

800 TO 2000 CANDLE POWER.

ESPECIALLY ADAPTED FOR

FOUNDRIES

PORTABLE, SELF-CONTAINED, AUTOMATIC.

NO SMOKE! NO SPRAY! NO SHARP SHADOWS!

Now in Valuable Use With Hundreds of Foundries

In addition to 400 Railroads and over 300 Contractors.

REQUEST CIRCULARS FROM

THE WELLS LIGHT M'F'G. CO.

EDWARD ROBINSON, Sole Proprietor.

44-46 WASHINGTON STREET, NEW YORK.

ROSS-MEEHAN FOUNDRY CO.,
CHATTANOOGA, TENN., May 5, '99.

The Wells Light M'f'g. Co., Nos. 44 and 46 Washington St., New York City:

GENTLEMEN—It is contrary to our rule to give testimonials, but an article with the merit of your Wells Light deserves to be made an exception. We have used your lights for the past five years, and consider them indispensible to us.

Yours very truly,
ROSS-MEEHAN FOUNDRY CO.
P. A. BRAWNER, JR., Sec'y. & Treas.

44-46 WASHINGTON STREET, NEW YORK.

Powellton Coke

• • •

Fulton's Table Exhibiting the Physical and Chemical Properties of Coke.

		Connellsville.	*Powellton.*
Grammes in one cubic inch,	Wet,	23.67	22.93
	Dry,	15.47	14.16
Pounds in one cubic foot,	Wet,	87.24	87.33
	Dry,	58.98	53.88
Percentage by volume,	Coke,	49.96	46.48
	Cells,	50.04	53.52
Compressive strength per cubic inch (¼) ultimate strength		301	381
Height of furnace charge supported without crushing,		120	152
Order in cellular space		1	1¼
Hardness		3.5	3.0
Specific gravity		1.89	1.86

ANALYSIS.

Fixed Carbon	87.46	91.048
Moisture	0.49	0.117
Ash	11.32	7.548
Sulphur	0.69	0.626
Phosphorus	0.029	0.007
Volatile Matter	.011	0.661

AVERAGE OF FOUR TESTS.

(Signed) JNO. FULTON, E. M.

Chemical Analysis by Prof. Andrew S. McCreath.]

The Mount Carbon Co. Ltd.

Powellton, W. Va.

Do you want to do business

With a Firm that handles more Foundry Pig Iron than any other in the World. . . . . .

What are some of the advantages of dealing with it?

One advantage is that through this firm your orders are placed with the most important manufacturers of Pig Iron and Coke in the United States; Companies of first rank, producing the best quality at lowest prices, whose contracts will be filled under all conditions.

Another advantage is that the firm represents so many different furnaces located in all parts of the iron producing regions, that it is in position to furnish any requirement from the most favorable sources of supply.

The success of the firm has been achieved by enterprise and fair dealing. The utmost consideration is given to all orders, whether for a single carload or for ten thousand tons.

Some of the leading interests represented are:

PIG IRON.

Tennessee Coal, Iron & R. R. Co., 17 Stacks and Five Brands.
Corrigan, McKinney & Co., 2 Stacks, Lincoln Malleable and Douglas Scotch.
Tonawanda Iron and Steel Co., 2 Stacks, Niagara Foundry and Tonawanda Scotch.
Colbert Furnace Co., West Point Ore Mixture.
Woodstock Iron Works, All Brown Ore, Strongest Alabama Brand.
Belfont Iron Works Co., Strong Foundry Iron.
Star Furnace Co., High Silicon Silvery.
Tropic Iron Co., High Silicon Silvery.
Punxsutawney Iron Co., choice Pennsylvania Brand.
Rome Iron Co., Best Southern Car Wheel Charcoal.
Buffalo Iron Co., Mannie Charcoal Softener.
Excelsior Furnace Co., Standard Lake Superior Charcoal.
Jefferson, Hanging Rock Cold Blast Charcoal.
Anchor, Hanging Rock Warm Blast Charcoal.
Olive, Hanging Rock Warm Blast Charcoal.

GENUINE 72-HOUR FOUNDRY COKE.

The Pocahontas Co., 2,700 Ovens in Flat Top District.
W. J. Rainey, Best Connellsville.
New Process, Extra Quality.
Davis Coal and Coke Co., a choice W. Va. Brand.
New River Brands, Standard Quality.

It has been found a decided benefit to be represented in the leading consuming districts by thoroughly organized branch houses, in charge of our partners and managers of long experience.

ORDERS FOR PIG IRON AND COKE ARE RESPECTFULLY SOLICITED.

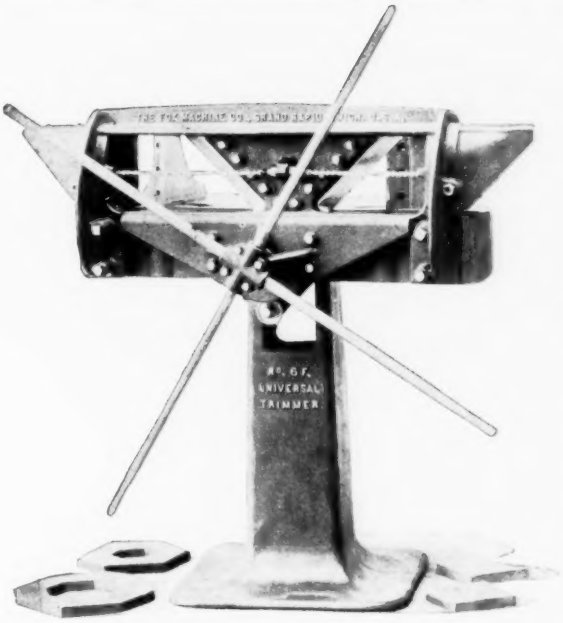
ROGERS, BROWN & COMPANY,

CINCINNATI, CHICAGO, NEW YORK, BOSTON, BUFFALO, CLEVELAND.

ROGERS, BROWN & MEACHAM. ST. LOUIS.

ROGERS, BROWN & WARNER, PHILADELPHIA. PITTSBURG.

20TH CENTURY TRIMMER



Powerful.
Accurate.
Quick to Handle.
Wide Range of Cut.

The F Trimmer

embodies the results of 18 years' experience in the manufacture and use of the Trimmer. Do not be deceived by imitations. Buy from the original makers.

12 AMERICAN AND FOREIGN PATENTS.
(Additional Patents applied for.)
Front View No. 6 F Universal Trimmer.

Eight Styles and Sizes of Trimmer

OVER 10,000 SOLD TO

Pattern-makers,
Cabinet-makers,
Builders for

Interior Finishing on Cars, Houses and Steam Ships.

No Pattern Room complete without a FOX TRIMMER. Send for Complete Catalogue.

Back View No. 6 F Universal Trimmer.
(Trade Mark Registered 20th Century Trimmer.)

FOX MACHINE CO. 850 N. Front St., GRAND RAPIDS, MICH.

DIRECTORY OF LEADING PIG IRON DEALERS.

HUGH W. ADAMS & CO.

Pig Iron Merchants

15 Beekman Street, NEW YORK

Boston Office, 85 Water Street

MATTHEW ADDY & CO.

CINCINNATI, ST. LOUIS.

Agencies,

Chicago, Detroit, New York,

Philadelphia, Pittsburg.

CLINTON IRON & STEEL CO.

Manufacturers of the

CLINTON INSPECTED FOUNDRY IRON

CELEBRATED "CLINTON" SOFTENER

PITTSBURG, PA

15 Cortlandt St., NEW YORK.

DAYTON COAL & IRON CO.

(Limited)

PIG IRON,

Dayton, Tenn. Cincinnati, Ohio:

THE DOMHOFF & JOYCE CO.

PIG IRON-COKE.

CINCINNATI.

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Incorporated

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BUFFALO,

PHILADELPHIA, NEW YORK,

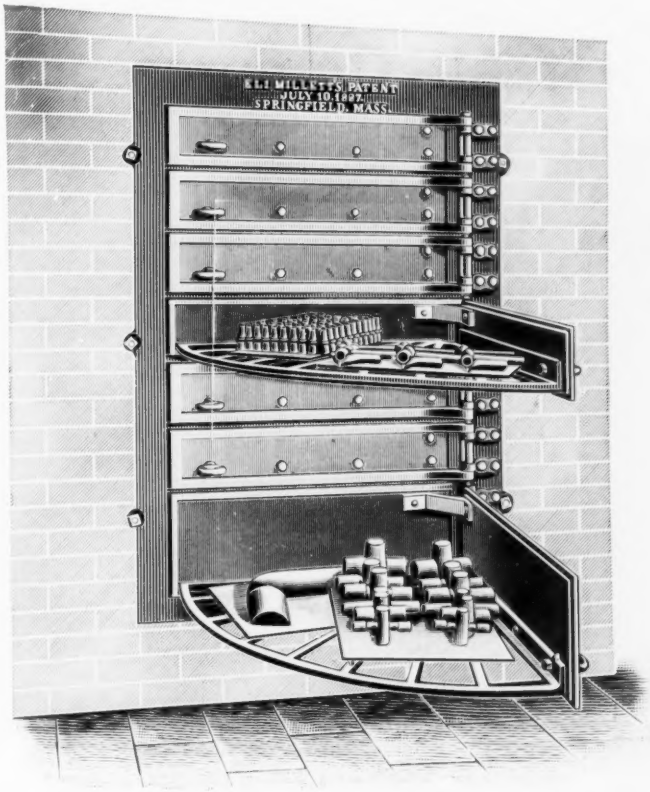
ST. LOUIS

STEVENSON, FIELD & CO.

PIG IRON and COKE,

Columbus, O. St. Louis, Mo.

Vanderbilt Bldg., New York.



If Time is Money To You

Then you will appreciate quick delivery of Cores, baked just right and not burnt.

The most progressive foundries in America and Europe have adopted the **MILLETT CORE OVEN.** Some time ago THE FOUNDRY illustrated the largest foundry in Switzerland and the second largest in Europe, in which the **Millett Oven** was used extensively and given unqualified approval. In this issue is illustrated the plant of the Westinghouse Air Brake Co., at Wilmerding, Pa., whose foundry in efficiency stands as the representative of American skill. **There are twenty-four (24) of our ovens in this plant alone**—a testimonial to their worth which goes further than anything we could say..

To responsible foundrymen we will ship our Oven on trial.
Be your own judge of its merits.

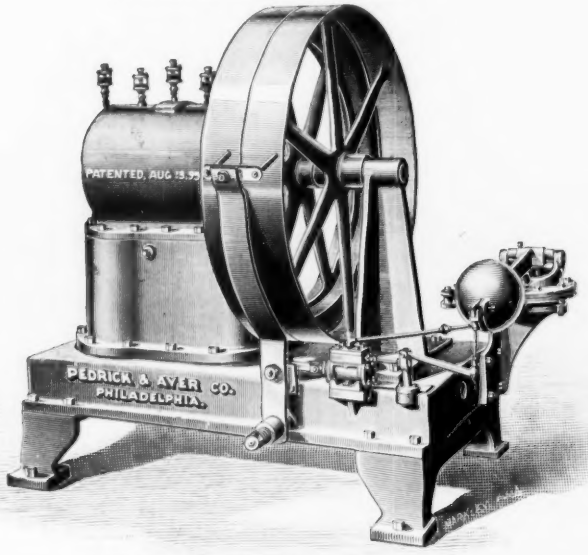
CATALOGUE IF YOU WANT IT.

The Millett Core Oven Co.

BRIGHTWOOD, MASS.

Automatic Compound Belt Air Compressors.

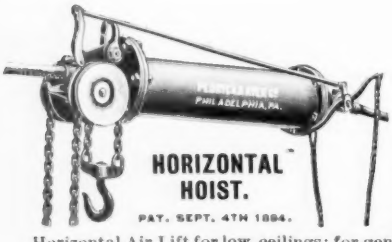
PATENTED AUGUST 13TH 1895.



Straight Lift Hoist.

Built in two sizes, Nos. 1 and 2.

No.	Size of Cylinders in inches	Revolutions per Minute.	Cubic Feet of Free Air	Horse Power Required.	Size of Pulleys in inches	Shipping Weight of Compressor	Floor Space in inches	Telegraphic Symbol
1	11x 6 6x 6	100-100	32- 50	2-3½	40x5	2875 lbs.	60x40	Parian
2	1·x10 8x10	90-120	90-120	9-15	60x6	5370 lbs.	76x60	Parish



HORIZONTAL HOIST.

PAT. SEPT. 4TH 1894.

AIR HOSE COUPLING

For ½ inch, ¾ inch and 1 inch Hose.

These Compressors will compress more air at less cost than any other make, requiring no attention other than oiling; entirely automatic in action, stopping and starting as air is required. Specially adapted for foundry use. Can be run in series, if so, no stoppage impossible.

Horizontal Air Lift for low ceilings; for general lifting, quick in action and under perfect control of operator.

Straight Air Lift for foundry purposes when equipped with retaining and releasing valve, will hold the load whether heavy or light, in the desired position, as in case of lifting a ladle of molten iron and pouring it or raising a flask to knock out the sand. It can neither ascend or decend as long as connected to air supply.

Air Hose Couplings are designed to do away with long lines of hose. By having suspended along the air line a number of hose equipped with this device, connections can instantly be made or disconnected, allowing one hoist to serve in several places. Each size made in duplicate. Containing a shut-off valve.

Send for circulars and details to Pedrick & Ayer Co., Pneumatic Department.

PEDRICK & AYER CO.

SPRING GARDEN STATION, PHILADELPHIA, PA.

Manning, Maxwell & Moore, *Sole Agents*, 111-113 Liberty St., New York City. 60 South Canal St., CHICAGO, ILL. 424 Telephone Bldg., PITTSBURG.

We Guarantee..

That one man with one of our **PNEUMATIC HAMMERS** can do more and better work than four men working in the ordinary way.

These same Hammers are also especially adapted for calking boilers and beading flues.

We also manufacture the best Air Drill on the market, and our Air Hoist and Compressors are especially designed for foundry work.

All tools sent on ten days' trial, subject to approval and are guaranteed for one year.

Chicago Pneumatic Tool Co.,

635 Monadnock Building, **CHICAGO, ILL.**

Whiting Foundry Equipment Co.

Works, HARVEY, ILL. (Chicago Suburb.)

THE WHITING CUPOLA embodies all that is desirable in the way of design, convenience, economy and good results generally . . . Among recent purchasers are NILES TOOL WORKS, HOFFMAN & BILLINGS, E. P. ALLIS & CO. —all experienced firms who want *the best.*

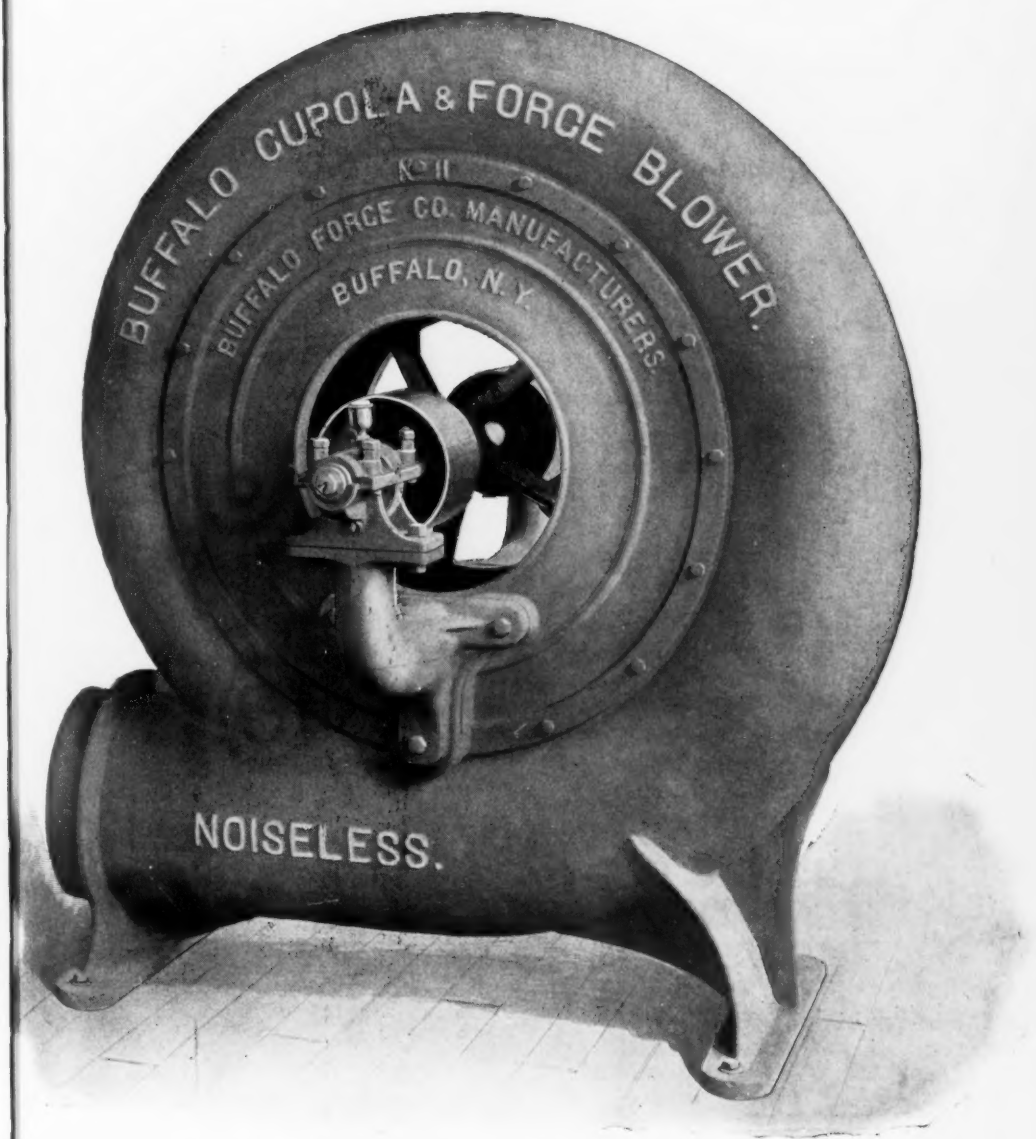
Our Improved Types of Ladles are worthy of your consideration; heavy, well made, easy to work; simple and durable. All sizes.

Don't overlook the .. fact that we make .. CRANES AND AIR HOISTS.

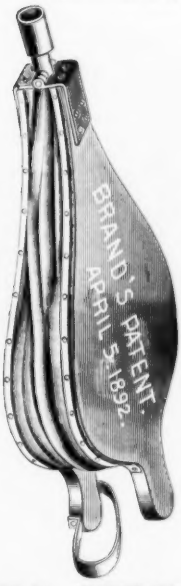
. . . IF YOU WANT A . . .

MOLDING MACHINE that will save half the room and do twice the work, write us about THE AVERY

CIRCULARS ON REQUEST.



Furnished with Combined Adjustable Bed and Countershaft when desired.



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Manufacturers **HIGH GRADE SUPPLIES**

99-101 W. MONROE ST., CHICAGO, U. S. A.

Sole and Only Manufacturers Brand's Patent Wire Brushes, Brand's Patent Bellows, Brand's Patent Nickle Plate Galvanized Riddles, Brushes, Shovels, etc.

Clinton Iron & Steel Co.

"FAIR DEALING" Their Motto.

MANUFACTURERS OF

"CLINTON" AND "HECTOR"

INSPECTED FOUNDRY IRONS . . . . .

ALSO

Sole Factors for DUNBAR STRONG IRON

In New York and New England.

FURNACES, PITTSBURGH.

NEW YORK OFFICE, No. 15 Cortlandt St.

Why deal with Commission people or Agents who give fancy names to Irons and know nothing about their manufacture.

DEAL WITH THE MANUFACTURER DIRECT.

ESTABLISHED 1854.

Brooklyn Fire Brick Works

CUPOLA BLOCKS, FIRE SAND, FIRE CLAY, FIRE MORTAR, KAOLIN

AND ALL FIRE MATERIAL REQUIRED FOR FOUNDRY PURPOSES.

Send for Illustrated Catalogue and Prices.

88 Van Dyke Street, BROOKLYN, N. Y.

GLUTROSE

(TRADE MARK.)

PATENTED . . . .
in the United States, England, France and Belgium . . . . .

The Universal Liquid Core Compound

Glutrose was invented and is manufactured by a practical foundryman of many years' experience. It has been used in large foundries for the past three years with the most satisfactory results.

CLAIM FOR GLUTROSE.

Glutrose is cheaper than flour, rosin, oil, molasses or any other core compound used. One 56 gallon barrel will go as far as four barrels of the best flour. Will keep any length of time and never varies in quality.

Glutrose makes the most difficult and complicated Cores for iron, steel or brass Castings of any size.

Does *not readily* absorb *moisture* from the mold.

Makes no offensive smell or smoke.

Will let the air and gases off from a Core which is difficult to *vent*, better than any other material in use.

GLUTROSE WILL NEVER BLOW THE CASTINGS.

The new grade of Glutrose just put on the market will make first-class radiator cores without rodding. Why pay 30 to 40 cents per gallon for linseed oil when the same results can be obtained for half the money. Send for sample and be convinced.

. . . . REFERENCES . . . .

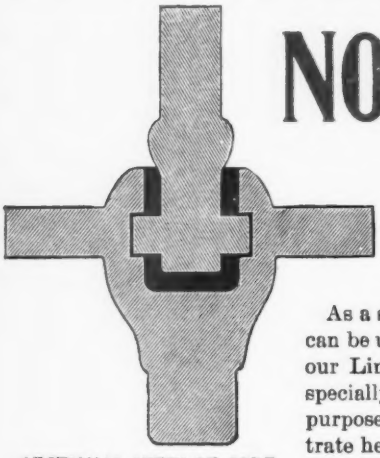
Southern Railway Co., Knoxville, Tenn.
Baltimore & Ohio Railroad, Baltimore.
Pennsylvania Railroad, Altoona, Pa.
Pennsylvania Iron Works, Philadelphia.
Geo. V. Cresson Co., Philadelphia.
Morris & Tasker, Philadelphia.
Westinghouse Electric & Mfg. Co., Pittsburg.
The McConway & Torley Co., Pittsburg.
Damascus Bronze Co., Pittsburg.
Pittsburg Steel Casting Co., Pittsburg.
American Agricultural Works, New York.
Lord & Burnham, Irvington, New York.
The Pusey & Jones Co., Wilmington, Del.
The Portland Co., Portland, Me.
Southern Malleable Iron Co. Chattanooga.
Whitney Iron Works, New Orleans.
Chickasaw Iron Works, Memphis.
The Snead & Co. Iron Works, Louisville.
Snow Steam Pump Works, Buffalo, N. Y.
Dayton Malleable Iron Co., Dayton, O.

AMERICAN GLUTROSE WORKS,

Factory . . .
CAMDEN, N. J.

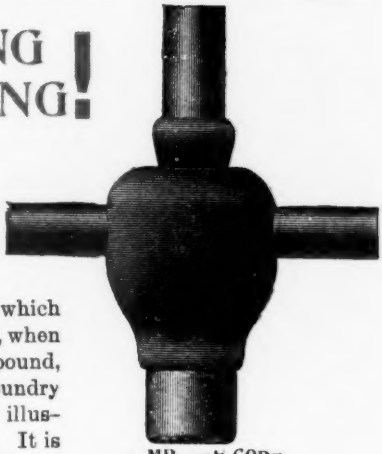
925 Chestnut Street,
PHILADELPHIA.

Can You Afford to Monkey with Flour?



SECTIONAL VIEW OF CORE.

NO VENTING BLOWING!



COMPLETE CORE.

As a sample of the cores which can be used without venting, when our Linseed Oil Core Compound, specially prepared for foundry purposes, is employed, we illustrate herewith a valve core. It is just such a casting as you have seen going to the scrap heap time and again, on account of the cores blowing, and they were well vented, too. No venting is necessary with our Compound. How much longer are you going to keep on in your old money-losing ways? Further particulars, samples and prices on request.

We have the documents to back our claims.

READ THIS LETTER!

RHODES, CURRY & CO., Ltd.
MANUFACTURERS OF
RAILWAY AND STREET CARS,
CAR WHEELS AND CASTINGS.

AMHERST, NOVA SCOTIA, Nov. 16, '97.

Holland Linseed Oil Co., Chicago, Ill.:

GENTLEMEN—Some time ago I induced this Company to order a barrel of your Core Compound, which is giving us excellent satisfaction. Last week I gave the Superintendent of Foundry of the Robb Engineering Co. a gallon to try on some cores which they had been having a great deal of trouble with, and the result was so satisfactory that you will hear from them with an order. I gave them the address of your Company, but did not give them any price. I have used a good many different core compounds while I was in charge of different shops in the States, but must say I have never used any that gives as good satisfaction as yours has given us. Yours truly,

W. H. FONDA,
Supt. of Foundry Dept.

HOLLAND LINSEED OIL CO.

683 AUSTIN AVENUE,

CHICAGO.

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The Coburn Patent Trolley Track

PARLOR DOOR HANGERS.

The adjustment is in the Track and not in the Hanger, as are others.

☞**Send for Book.**

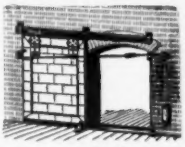
The Coburn Patent Trolley Track

BARN DOOR HANGERS.

Impossible for door to jump the track. Very simple and cheap to apply.

☞**Send for Book.**

The Coburn Patent Trolley Track



FIRE DOOR HANGERS.

Recommended and adopted by fire underwriters all over the United States.

☞**Send for Book.**

The Coburn Patent Trolley Track

Overhead Tramway

Furnished complete with straight and curved track, switches, frog brackets, single and double carriers.

☞**Send for Book.**

The Coburn Patent Trolley Track

—AND—

Patent Rolling Ladder Systems

Over 10,000 in use in the U. S. Roll suspended from ceiling or facing the shelves.

☞**Send for Book.**

The Coburn Trolley Track Mfg. Co.,

HOLYOKE, MASS.

Smooth On Castings.

Smooth On Cores.

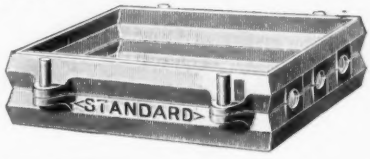
WRITE FOR NEW CATALOGUE AND PRICES.

SMOOTH ON MFG CO 551 Communipaw Ave., JERSEY CITY, N. J.

Estate of Oscar Barnett. BRUEN, HAMILTON and McWHORTER STREETS NEWARK, N. J.

Equippers of BRASS FOUNDRIES and Manufacturers of

☞ Not milled with an emery wheel, but accurately planed.



ESTABLISHED 52 YEARS.

Low quotations promptly furnished.

FINISHED HARDWARE SPECIALTIES TO ORDER

Standard Flasks

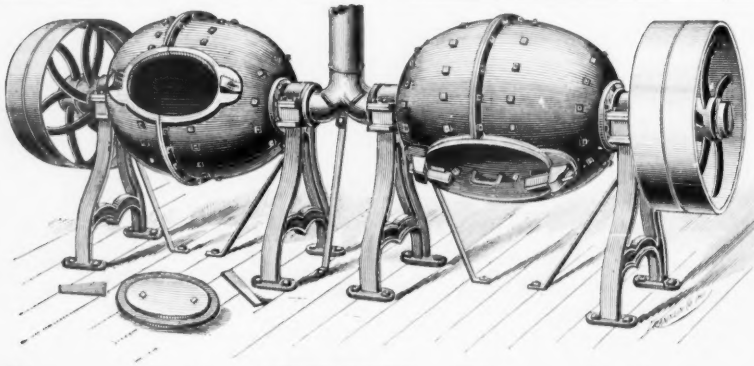
OSCAR BARNETT'S

Beveled . . . . . .

Straight Side . . . . .

—AND—

Improved Light Ribbed



A Fine Pair

Stover's IMPROVED EXHAUST Tumbling Barrels

The Stover Egg Shaped Barrel does doublethe work of any other with less noise and power. It gives the contents a double motion or action—from ends to center and from side to center—causing a thorough mixing and rubbing together of all the parts contained therein, cleaning and polishing the contents better and quicker than any other form of barrel.

Sent on 30 days approval to any responsible manufacturer of light castings, malleable iron wire nails, or any other small articles that require cleaning and polishing.

For full particulars, address,

Stover Manufacturing Co.

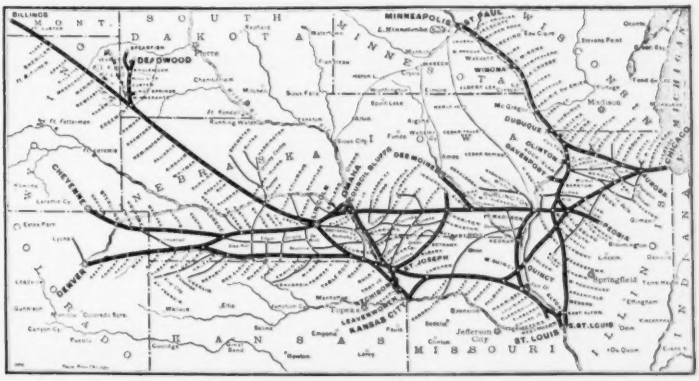
205 RIVER STREET, FREEPORT ILL

Burlington Route

A WORD TO MANUFACTURERS

The Industrial Department of the Chicago, Burlington & Quincy Railroad is organized for the purpose of aiding in the location of factories along the line of this road. No section of the country has greater resources to attract the manufacturer. Cheap coal and an abundance of raw material. Many cities on our line offer liberal inducements to aid in establishing new plants.

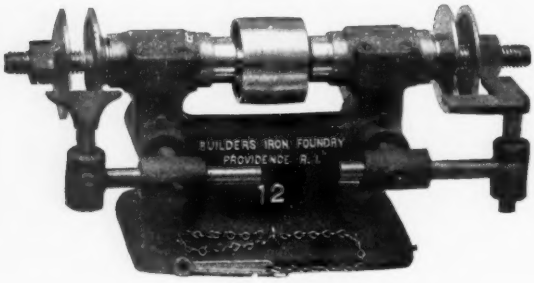
We solicit correspondenee, and will assist manufacturers seeking a new location in every way possible. *GEO. H. ROSS, Superintendent,*
209 Adams St., CHICAGO, ILL.



A MAP OF THE BURLINGTON ROUTE — ITS 7500 MILES OF ROAD REACH EVERY IMPORTANT CITY BETWEEN THE GREAT LAKES AND THE ROCKY MOUNTAINS.

A NEW LINE OF

Grinding and Polishing Machinery



12 INCH GRINDER.

NEW DESIGNS.

Large Spindles,
Self-Oiling Bearings,
The Best Materials,
Accurate and Careful Machine Work and Construction.

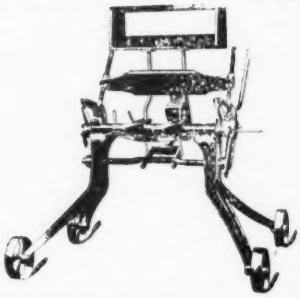
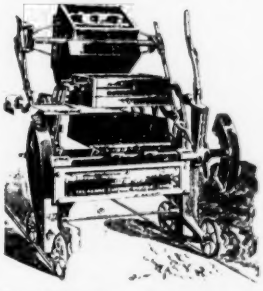
THESE POINTS APPEAL TO ALL BUYERS.

We have been snagging castings for 60 years and know the work required of a grinding machine.

For Sale by Leading Machinery and Supply Dealers Throughout the Country

BUILDERS' IRON FOUNDRY, Codding, Westminster and Dodge Sts., PROVIDENCE, R. I.

FARWELL'S MOULDING MACHINES Send for Catalogue

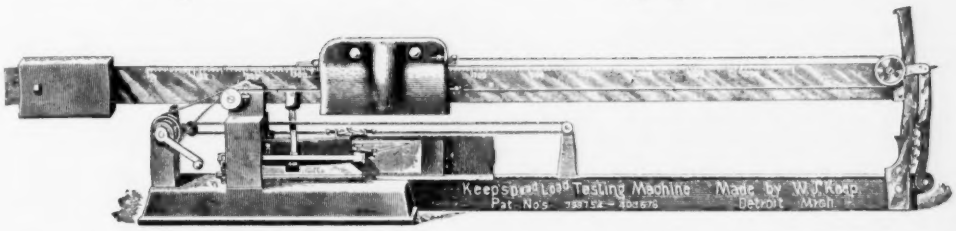
THE ADAMS COMPANY, DUBUQUE, IOWA

The evenings are getting longer

and it will be money in your pocket to keep in good company. "Metallurgy of Cast Iron," "American Foundry Practice," "The Molder's Text Book," "The Iron Founder," and "The Iron Founder Supplement" are the kind of company to have around you for your own advantage. We can furnish you with any of these books.

THE FOUNDRY PUBLISHING CO., DETROIT, MICH.

"Keep's Test" Apparatus.



HERE IS WHAT ONE LARGE CONCERN SAYS:-IT HAS PAID THEM, WHY NOT YOU?

DETROIT, MICH., March 31st, 1896.

Mr. W. J. Keep, City:

DEAR SIR: We have regulated our foundry mixture by "Keep's Test" during the past year, and can recommend it in highest terms. We know exactly what we are doing and can keep our castings of uniform quality. We find that .160 inches per foot the best shrinkage, and have been able to keep the average strength of a test bar ½ inch square and 12 inches long at 450 pounds.

Very truly yours,
LELAND & FAULCONER MFG. CO.,
H. M. LELAND, Vice-President.

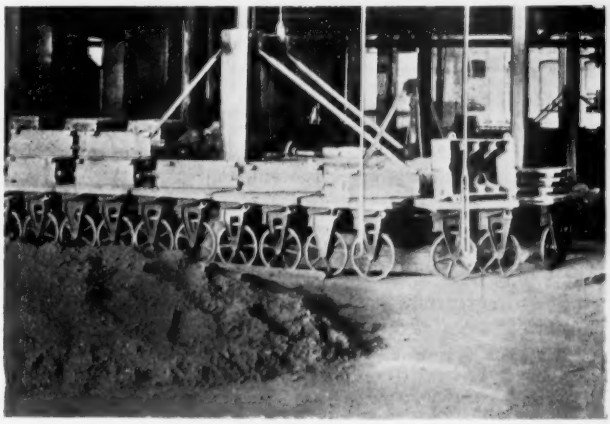
TO SAVE MONEY IN YOUR OWN FOUNDRY, ADDRESS **W. J. KEEP, Detroit, Mich.**

THE * LINK-BELT * COMPANIES

PHILADELPHIA. (Nicetown.) | NEW YORK. (49 Dey Street.) | CHICAGO. 39th and Stewart Ave.

EXCLUSIVE MANUFACTURERS UNDER PATENTS OF

THE
Welsh Continuous Molding System
AND THE
Dodge Flask Conveyor.

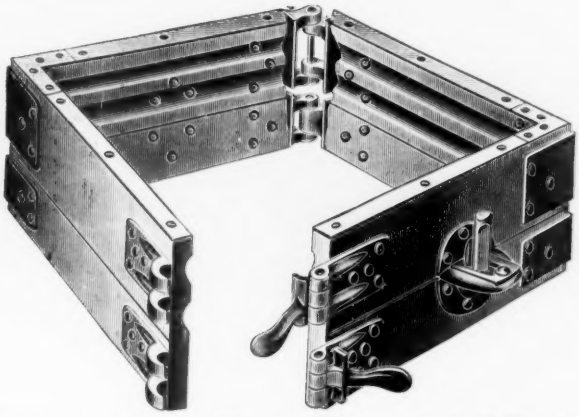


The above illustration is from the foundry of the Westinghouse Air Brake Co., at Wilmerding. The Flask Conveyor shown, as well as the entire Sand-Handling System, were designed and supplied by us, and have been in operation for the past eight years.

WE BUILD TO MEET ANY REQUIREMENTS.

We can save you money by building your Snap Flasks.

EUREKA IMPROVED SNAP FLASK.



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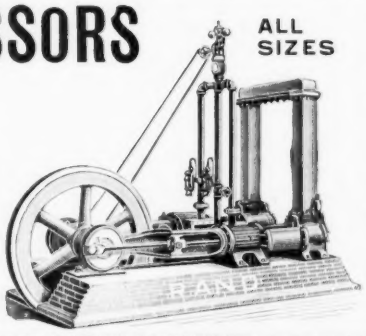

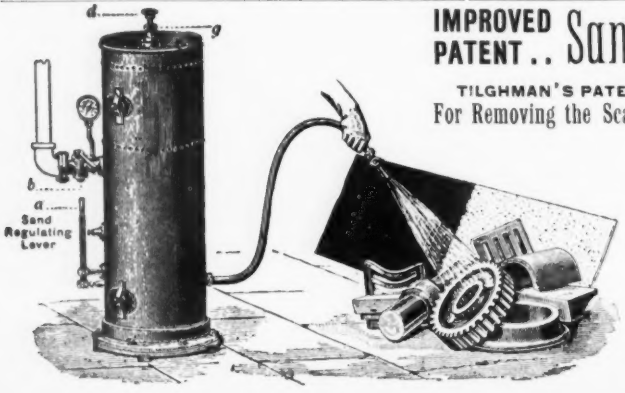

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TILGHMAN'S PATENTS. MATHEWSON'S PATENTS.

For Removing the Scale from Iron and Steel Plates.

Cleaning Castings, Forgings, etc

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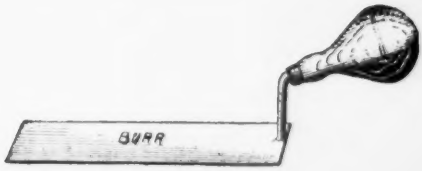

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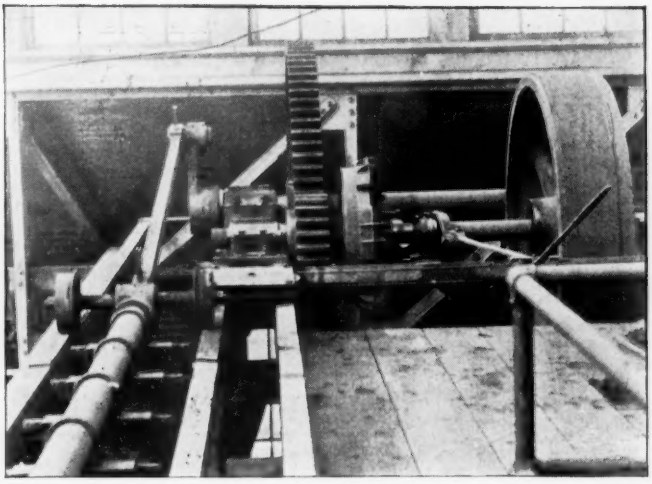

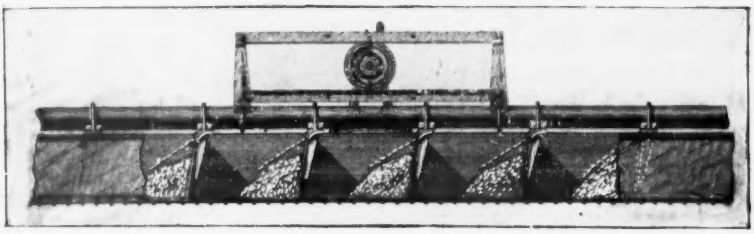

Views of 230-foot Reciprocating Sand Conveyer at Westinghouse Air Brake Co.'s Foundry, . . Wilmerding, Pa.

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Complete Installations.

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FACING is gaining ground. It beats all other kinds of Facing for Fine Castings. Let us explain its many virtues to you.

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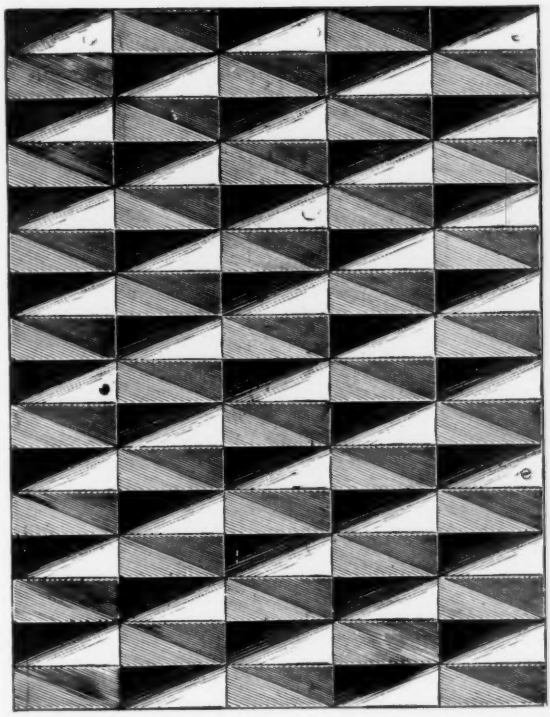

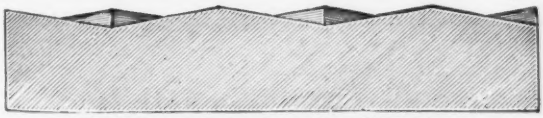

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This Patent Lumber is made by a Special Machine invented by us, the ONLY Machine of its kind, and each piece will match PERFECTLY with all other pieces, by "joining" the edges to the centre, lengthwise, or any row of Diamonds.

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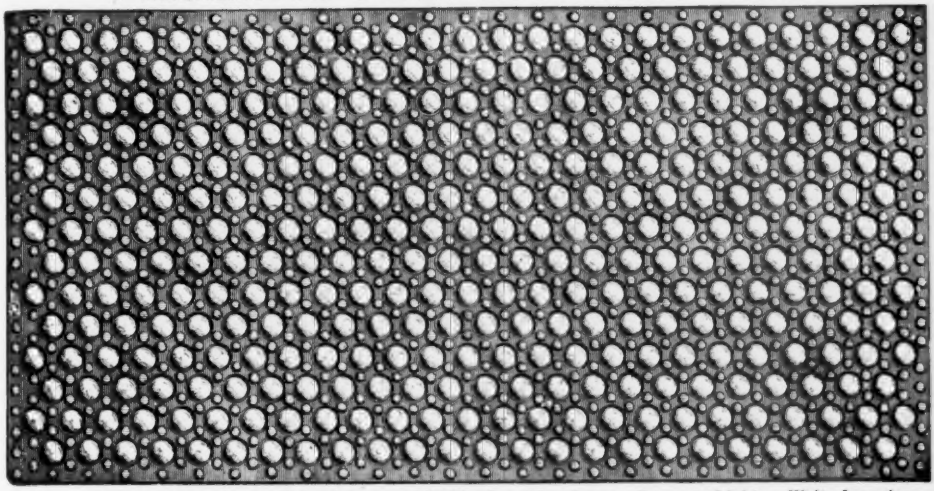

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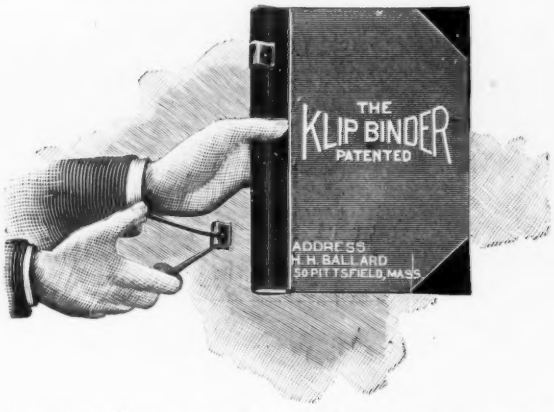

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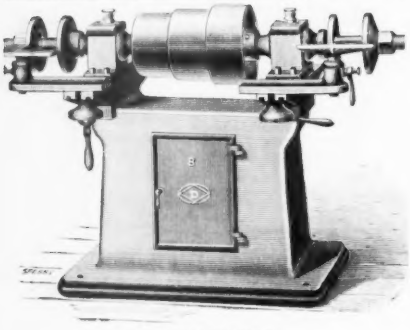

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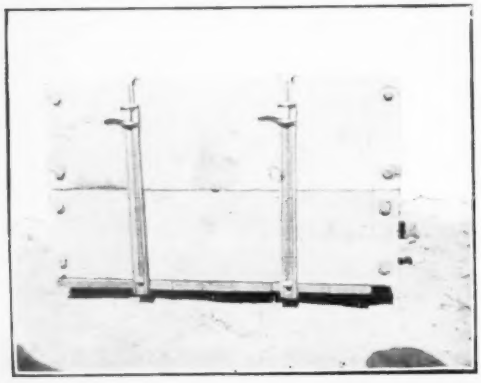

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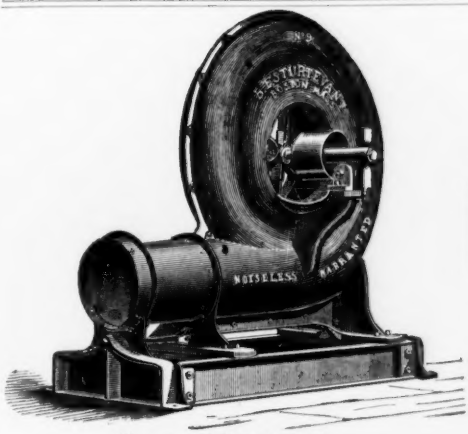

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Cupola Furnaces and Forge Fires.

BLOWERS

Furnished without Bed with Separate Countershaft

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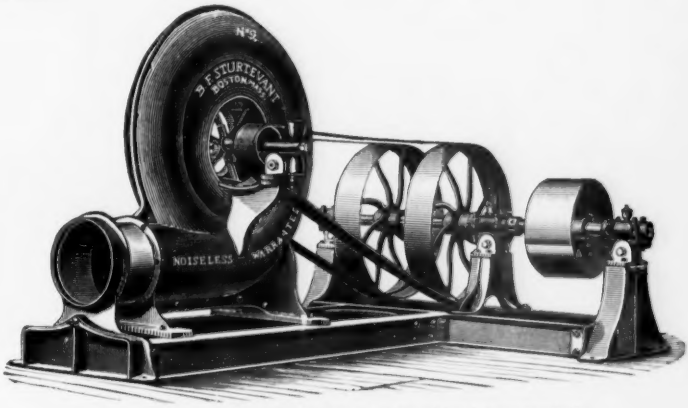
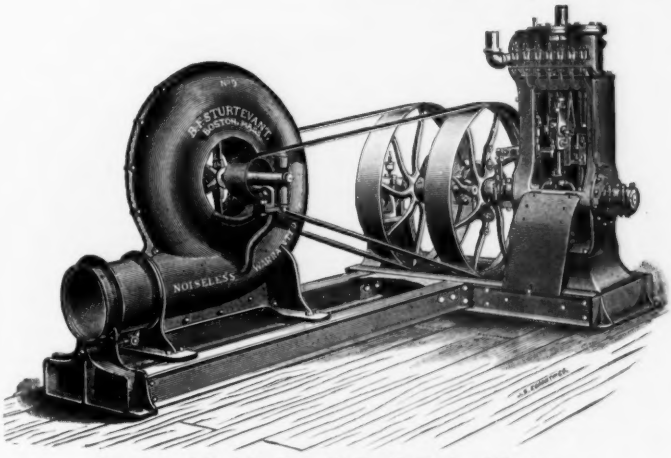


Blower on Adjustable Bed with Combined Countershaft.



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SOLID FRAME.
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PERFECT FORWARD DUMP.
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by which is produced better cores at lower cost than by any other known method. Cores made with it need not be baked, just dried. This saves time and fuel.

It is a superior article for use in Skin Drying Molds, in fact, it supplants flour, oil, molasses and other substances in any part of the foundry business.

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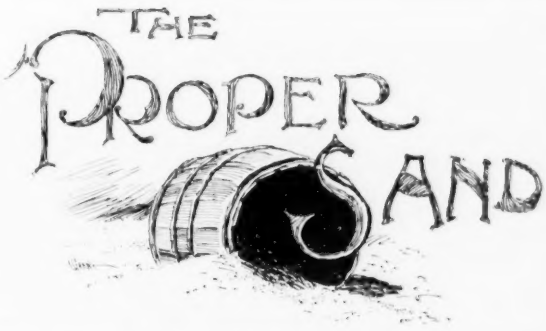

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FOR MEN THAT

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using them and then they cannot be surpassed in durability; 90 heats have been attained from one crucible. Send for testimonials, quantity and sizes wanted, and we will quote you figures.

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PURE and HEAVY, is the only material for FACINGS if you want a bright smooth casting or for a Lubricant or Stove Polish, etc.

We keep it for sale.

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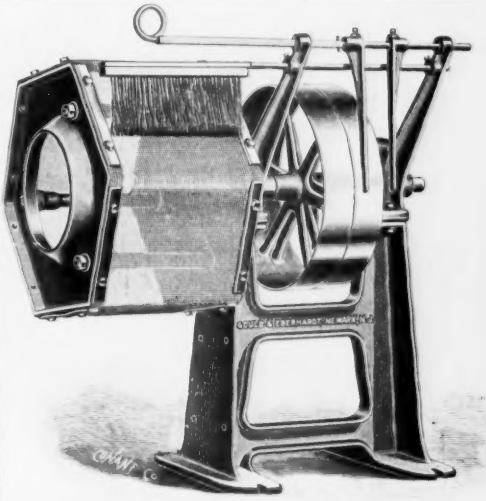

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Messrs. Gould & Eberhardt:

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. . . The day has gone by when they will accept almost anything
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. . . If you really want your castings nice, advise us as to their
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. . . No high-sounding, catchy names to our goods.
. . . We simply call them what they are.
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. . . Results only count.

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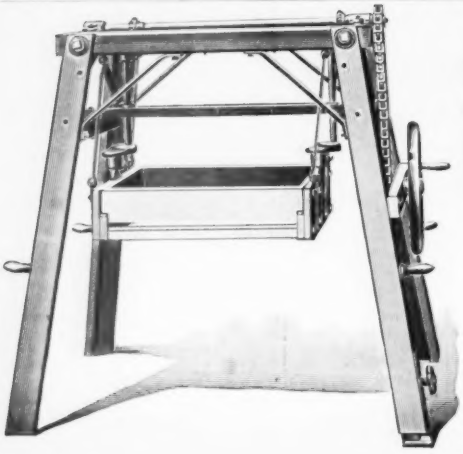

THE PERFECT

Sand Riddling Machine

This is the Best, Simplest, Cheapest, Most Durable and Most Easily Operated Sand Riddling Machine made.

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THE SPRINGFIELD FOUNDRY CO.
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USING WOOD OR METAL SPLIT PATTERNS, WITHOUT STRIPPING PLATES.

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FOR ALL PURPOSES.

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Take the tool to the work and save heavy handling.

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Some people are as full of ideas as a "wiener wurst" is full of other things.

THE TROUBLE IS, the ideas are sometimes wrong. They . . advertise four or five different kinds of Plumbago, which they "manufacture" and offer under different names and prices.

The cold fact is, Plumbago — or Ceylon Lead—is manufactured as blue sky is, in the work-room of Nature.

The more it comes in contact with man, the more it is contaminated, the more adulterated.

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The more adulteration, the more waste. Every puff from the molder's bellows blows it off from the mold; the casting don't peel and the molder kicks; so does the proprietor when he sees the casting.

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Heavy Stove Plate Facing,

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The Work of These Cupolas Has Never Been Equaled.

1st. In quantity of metal melted in a given time.
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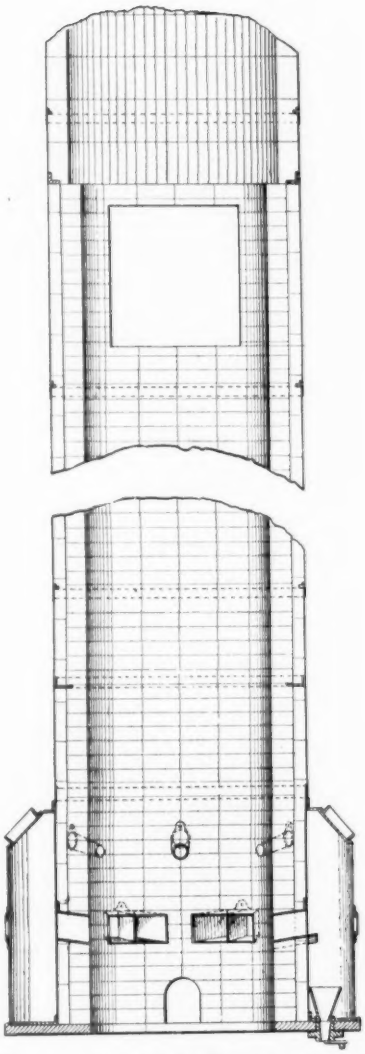

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Dixon's Crucibles

Are made of many mixtures to suit all kinds of work.
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Are made special for Nickel Melting.
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Are made special for Phosphor Bronze Melting.
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DEALERS IN

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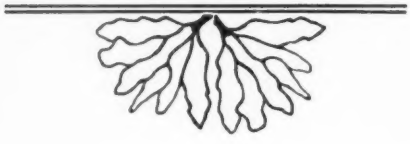

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We make All Sizes, from 8 oz. to 2 ton Capacity.

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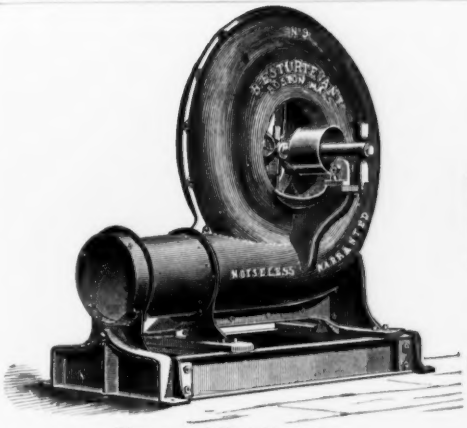


Blower on Adjustable Bed.

THE STURTEVANT STEEL Pressure Blowers,

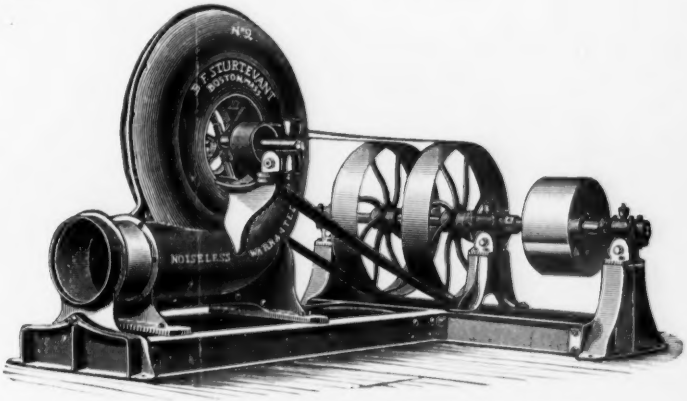
—FOR—

Cupola Furnaces and Forge Fires.

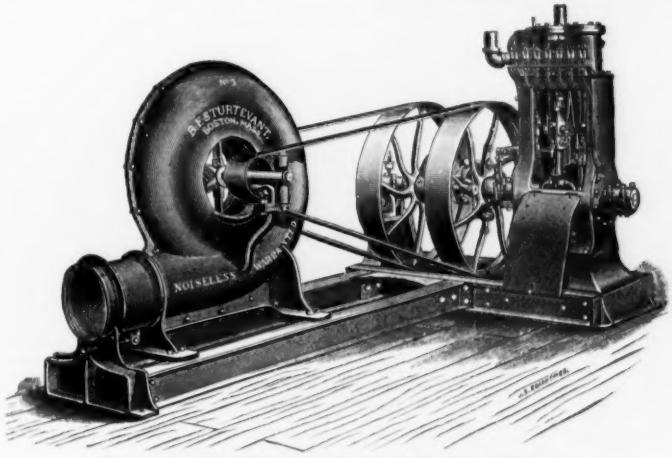
BLOWERS

Furnished without Bed with Separate Countershaft

BLAST GATES



Blower on Adjustable Bed with Combined Countershaft.



Blower on Adjustable Bed with Double Enclosed Engine.

BLOWERS

WITH

THE STURTEVANT

Direct Connected

Electric Motors

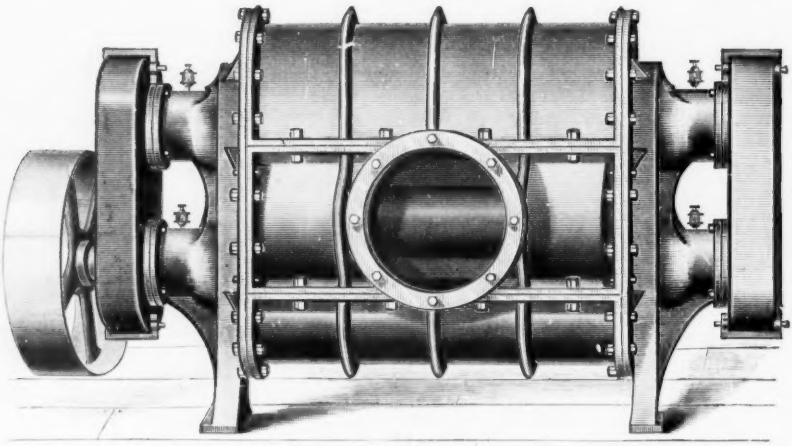
Send for Catalogue.

B. F. STURTEVANT CO.,

BOSTON, MASS.

131 Liberty Street, NEW YORK. 135 N. Third St., PHILADELPHIA.
16 S. Canal St., CHICAGO. 75 Queen Victoria St., LONDON.
STOCK CARRIED AT BRANCHES.

The Green Rotary Pressure Blower



Working parts are two perfectly balanced impellers, mounted on the best steel shafts, running in bronze bushes, cut gearing at both ends of the Blower enclosed in oil-tight casing.

Weighs less, occupies less space, costs less for freight than any other POSITIVE BLOWER in existance.

FOUNDRY BLOWERS

High Pressure Blowers

GAS EXHAUSTERS

Exhausters for Hot Gases

The GREEN Gives the Most Value for a $.

Wilbraham Baker Blower Co.,

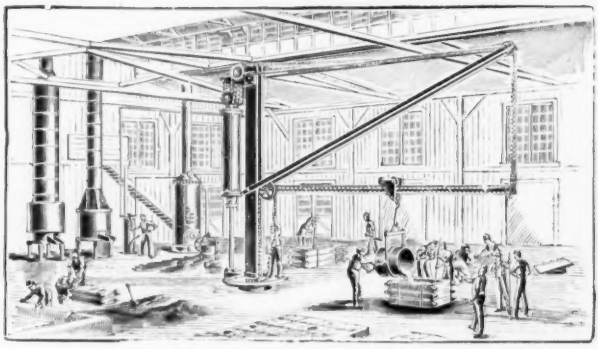
2518 Frankford Ave., PHILADELPHIA, PA.

WASHINGTON COAL & COKE CO.
CAPITAL PAID UP
$250,000.00
Youghiogheny Coal · High Grade Coke ·
DAWSON, PA.
COAL MINES & COKE WORKS
On Pittsburgh Lake Erie Railroad
GENERAL OFFICE
Greensburg, Pa.
SALES OFFICE
Pittsburg, Pa.
P.G. COCHRAN President
JNO. H. WURTZ Secretary
J.R. LAUGHREY Treasurer
J.S. NEWMYER Manager
INDIVIDUAL CARS.
N. P. HYNDMAN, Sales Agent
PITTSBURG PA.

THIS IS A GOOD STORY!

If you follow the directions and tell it well.

An Old Miller owned an Old Mill. It was a regular old timer, where the grain is ground on mill-stones which, as they grind, sing a song you've heard many a time when you were a bare-footed boy and went a fishing. This Old Miller had some repairs to make, so he hired a Millwright by the day to work for him. As the Old Miller sat in his little office by the stove listening to the sound of the Millwright's hammer, the Old Mill seemed to be droning:



5-ton Steam-Hydraulic Crane in a Foundry.

(Sing this very slowly.)

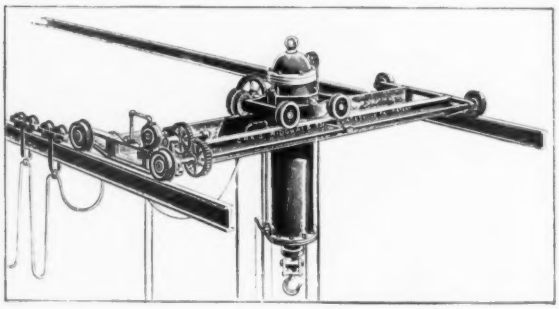
"We—are—working—by—the—day—by—the—day
By—the—day
We—are—working—by—the—day—by—the—day
By—the—day."

The Old Miller didn't altogether like this song, so the next time he had some work to do to his mill, he made the Millwright do it by contract. As the Old Miller sat in his little office by the stove listening to the Millwright's hammer, this time the old Mill seemed to sing:—

(Sing this as fast as you can.)

"We are working by the job, by the job, job, job.
We are working by the job, by the job, job, job."

MORAL:—Use a Ridgway Steam Hydraulic Crane and put some of the "job, job, job" spirit into your men and into your establishment. The Ridgway Crane will do your work while other cranes are getting a start to move, and you know men are affected by their environment. Men who work with quick acting machines catch their spirit.



Air Hoists. No Jump.

If you need Air Hoists, this is the one to get. A little oil in the piston rod does the business for Mr. Air Hoist and he becomes the gentlest of creatures, which is what you want in a machine that handles loads with men under them.

Cost but little more than our plain hoists and are invaluable. Get a sample hoist and try it.

"PLEASE TAKE THE ELEVATOR."

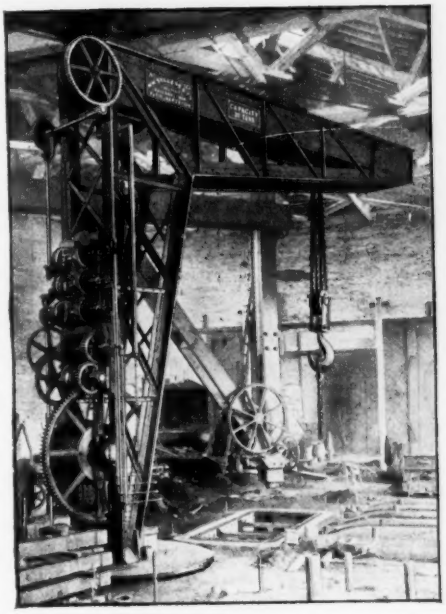
Will Save You Lots of Money.

CRAIG RIDGWAY & SON, COATESVILLE, PA.

William Sellers & Co., Incorp.

PHILADELPHIA.

MODERN FOUNDRY MACHINERY



In connection with our Machine Tool Business, we conduct a large foundry where practical tests are continually made of new labor-saving devices. The manufacture of

IMPROVED FOUNDRY CRANES

has become an important feature.

The accompanying illustration shows a quick-acting 30-ton Steam Jib-Crane, erected in the foundry of J. Morton Poole Co., Wilmington, Del., superceding old wooden cranes, one of which appears in the background.

This crane is driven by independent 8" x 8" engines. The platform levers are near the floor. The effective radius of hook is 23 feet.

In future issues of this magazine, we will show illustrations of Jib and Traveling Cranes operated by electric motors.

Centrifugal Sand Mixer

Since the introduction and favorable reception of this effective, expeditious and economical **machine for preparing sand for molds and cores** we have simplified its construction and cheapened its cost. The capacity of the machine is remarkable, being limited only by the facilities for feeding sand into the hopper. Two men will easily shovel 5 tons an hour into the machine.

The qualities of "toughness" and "porosity" are materially improved by this process of preparing molding sand.

Over 10,000 in Use.

ALWAYS READY!

800 TO 2000 CANDLE POWER.

ESPECIALLY ADAPTED FOR

FOUNDRIES

PORTABLE, SELF-CONTAINED, AUTOMATIC.

NO SMOKE! NO SPRAY! NO SHARP SHADOWS!

Now in Valuable Use With Hundreds of Foundries

In addition to 400 Railroads and over 500 Contractors.

REQUEST CIRCULARS FROM

THE WELLS LIGHT M'F'G. CO.

EDWARD ROBINSON, Sole Proprietor.

44-46 WASHINGTON STREET, NEW YORK.

ROSS-MEEHAN FOUNDRY CO.
CHATTANOOGA, TENN., May 5, '96.

The Wells Light M'f'g. Co., Nos. 44 and 46 Washington St., New York City:

GENTLEMEN—It is contrary to our rule to give testimonials, but an article with the merit of your Wells Light deserves to be made an exception. We have used your lights for the past five years, and consider them indispensible to us.

Yours very truly,
ROSS-MEEHAN FOUNDRY CO.
P. A. BRAWNER, JR., Sec'y. & Treas.

Powellton Coke

• • •

Fulton's Table Exhibiting the Physical and Chemical Properties of Coke.

		Connellsville.	*Powellton.*
Grammes in one cubic inch,	Wet,	23.67	22.93
	Dry,	15.47	14.16
Pounds in one cubic foot,	Wet,	87.24	87.33
	Dry,	58.98	53.88
Percentage by volume,	Coke,	49.96	46.48
	Cells,	50.04	53.52
Compressive strength per cubic inch (¼) ultimate strength		301	381
Height of furnace charge supported without crushing,		120	152
Order in cellular space		1	1¼
Hardness		3.5	3.0
Specific gravity		1.89	1.86

ANALYSIS.

Fixed Carbon	87.46	91.048
Moisture	0.49	0.117
Ash	11.32	7.548
Sulphur	0.69	0.626
Phosphorus	0.029	0.007
Volatile Matter	.011	0.661

AVERAGE OF FOUR TESTS.

(Signed) JNO. FULTON, E. M.

Chemical Analysis by Prof. Andrew S. McGreath.]

The Mount Carbon Co. Ltd.

Powellton, W. Va.

44-46 WASHINGTON STREET, NEW YORK.

P. A. BRAWNER, JR., Sec'y. & Treas.

DIRECTORY OF LEADING PIG IRON DEALERS.

MATTHEW ADDY & CO.

CINCINNATI, ST. LOUIS.

Agencies,

Chicago, Detroit, New York,
Philadelphia. Pittsburg.

CLINTON IRON & STEEL CO.

Manufacturers of the

CLINTON INSPECTED FOUNDRY IRON

CELEBRATED "CLINTON" SOFTENER

PITTSBURG, PA

15 Cortlandt St., NEW YORK.

DAYTON COAL & IRON CO.

(Limited)

PIG IRON,

Dayton, Tenn. Cincinnati, Ohio.

THE DOMHOFF & JOYCE CO.

PIG IRON-COKE.

CINCINNATI.

F. A. GOODRICH & CO.

Incorporated

PIG IRON, STEEL, COKE, ETC.

Detroit, Mich.

M. A. HANNA & CO.,

COAL, IRON ORE
and PIG IRON.

Cleveland, Ohio.

THOMAS A. MACK,

PIG IRON,

Cincinnati, - - Ohio.

PICKANDS, BROWN & CO.,

Manufacturers, Importers
and Dealers in

PIG IRON AND IRON ORE.

Rookery Building, CHICAGO.

PILLING & CRANE,

PIG IRON and COKE,

Carnegie Building,
PITTSBURG, PA.

Girard Building,
PHILADELPHIA, PA.

ROGERS, BROWN & CO.

CINCINNATI, CHICAGO,

BUFFALO,

PHILADELPHIA, NEW YORK,

ST. LOUIS

STEVENSON, FIELD & CO.

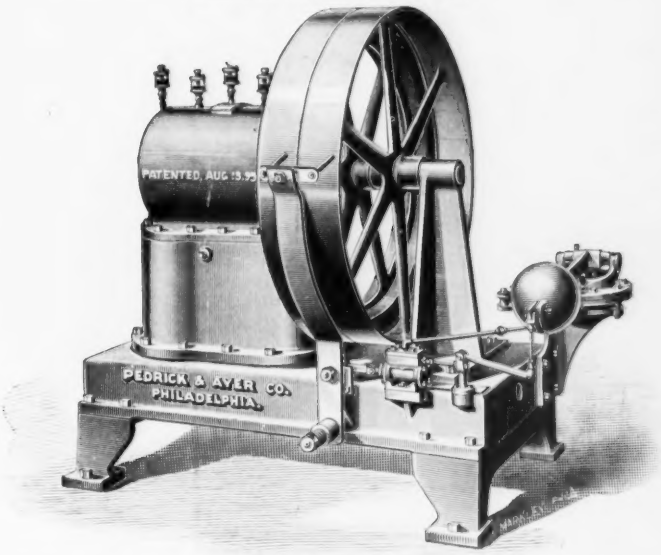
PIG IRON and COKE,

Columbus, O. St. Louis, Mo.

Vanderbilt Bldg., New York.

Automatic Compound Belt Air Compressors.

PATENTED AUGUST 13TH 1895.



Straight Lift Hoist.

Built in two sizes, Nos. 1 and 2.

No.	Size of Cylinders in inches	Revolutions per Minute.	Cubic Feet of Free Air	Horse Power Required.	Size of Pulleys in inches	Shipping Weight of Compressor	Floor Space in inches	Telegraphic Symbol
1	11x 6 6x 6	100-160	32- 50	2-3½	40x5	2875 lbs.	60x40	Parian
2	13x10 8x10	90-120	90-120	9-15	60x6	5370 lbs.	76x60	Parish

HORIZONTAL HOIST.

PAT. SEPT. 4TH 1894.

AIR HOSE COUPLING

For ½ inch, ¾ inch and 1 inch Hose.

These Compressors will compress more air at less cost than any other make, requiring no attention other than oiling; entirely automatic in action, stopping and starting as air is required. Specially adapted for foundry use. Can be run in series, if so, no stoppage impossible.

Horizontal Air Lift for low ceilings; for general lifting, quick in action and under perfect control of operator.

Straight Air Lift for foundry purposes when equipped with retaining and releasing valve, will hold the load whether heavy or light, in the desired position, as in case of lifting a ladle of molten iron and pouring it or raising a flask to knock out the sand. It can neither ascend or decend as long as connected to air supply.

Air Hose Couplings are designed to do away with long lines of hose. By having suspended along the air line a number of hose equipped with this device, connections can instantly be made or disconnected, allowing one hoist to serve in several places. Each size made in duplicate. Containing a shut-off valve.

Send for circulars and details to Pedrick & Ayer Co., Pneumatic Department.

PEDRICK & AYER CO.

SPRING GARDEN STATION, PHILADELPHIA, PA.

Manning, Maxwell & Moore, *Sole Agents*, 111-113 Liberty St., New York City. 60 South Canal St., CHICAGO, ILL. 424 Telephone Bldg., PITTSBURG.

We Guarantee..

That one man with one of our **PNEUMATIC HAMMERS** can do more and better work than four men working in the ordinary way.

These same Hammers are also especially adapted for calking boilers and beading flues.

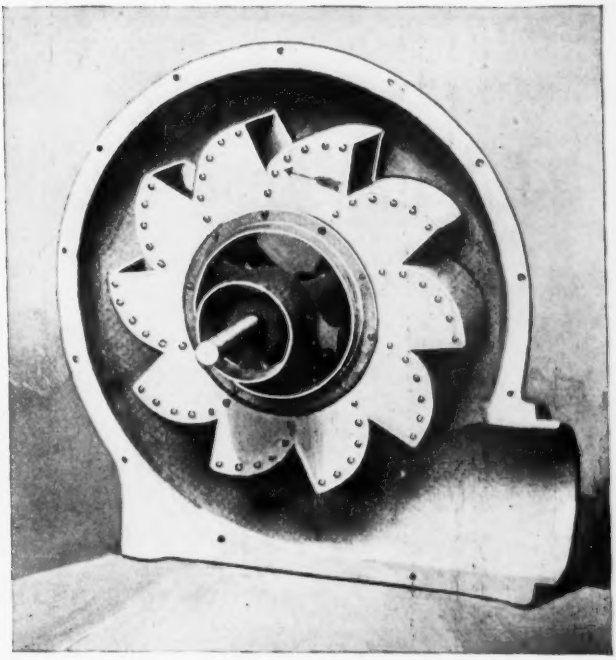
We also manufacture the best Air Drill on the market, and our Air Hoist and Compressors are especially designed for foundry work.

All tools sent on ten days' trial, subject to approval and are guaranteed for one year.

Chicago Pneumatic Tool Co.,

635 Monadnock Building, **CHICAGO, ILL.**

Announcement....



OFFICE OF
THE NEW JERSEY BLOWER COMPANY.

NEWARK, N. J., December 1, 1897.

TO THE TRADE:—We take pleasure in announcing that we have made arrangements with Messrs.

J. B. & J. M. CORNELL,

26th Street and 11th Avenue, NEW YORK.

under which they will assume the manufacture and sale of the **New Jersey Steel Pressure Blowers and Exhausters** heretofore made by us. In this connection we congratulate the trade upon the advantages to them of this arrangement in view of the recognized position of Messsrs. Cornell and the increased facilities which they possess at their West Point Foundry, Cold Spring, N. Y., for manufacturing and marketing the machines, and we solicit for them a continuance of the favors which have been accorded to us.

NEW JERSEY BLOWER COMPANY.

Whiting Foundry Equipment Co.

Works, HARVEY, ILL. (Chicago Suburb.)

THE WHITING CUPOLA embodies all that is desirable in the way of design, convenience, economy and good results generally . . . Among recent purchasers are NILES TOOL WORKS, HOFFMAN & BILLINGS, E. P. ALLIS & CO. —all experienced firms who want *the best.*

Our Improved Types of Ladles are worthy of your consideration; heavy, well made, easy to work; simple and durable. All sizes.

Don't overlook the .. fact that we make .. CRANES AND AIR HOISTS.

. . . IF YOU WANT A . . .

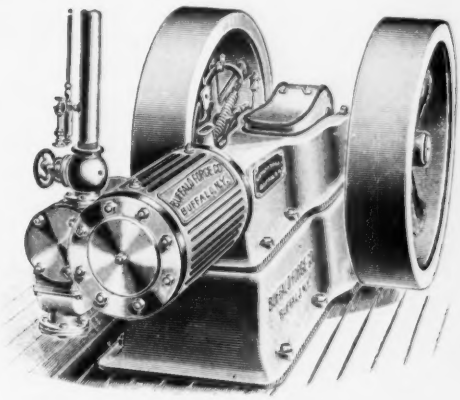
MOLDING MACHINE that will save half the room and do twice the work, write us about THE AVERY

CIRCULARS ON REQUEST.

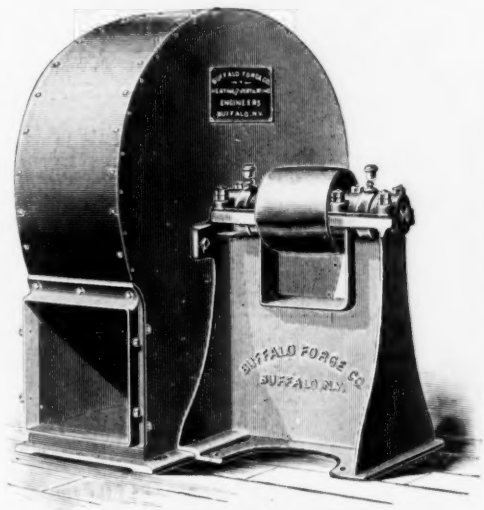
CUPOLA BLOWER.

For the latest development in Cupola Blower construction and application, see BUFFALO FORGE CO.'s 1896 Sectional Catalogue, "America's Best the World's Standard."

BUFFALO FORGE CO.'s Automatic Cut-off Engine, Horizontal and Upright types for Electric Lighting and Power purposes, direct connected or belted. 1896 Sectional Catalogue furnishes full details.



CLASS "A" HORIZONTAL.

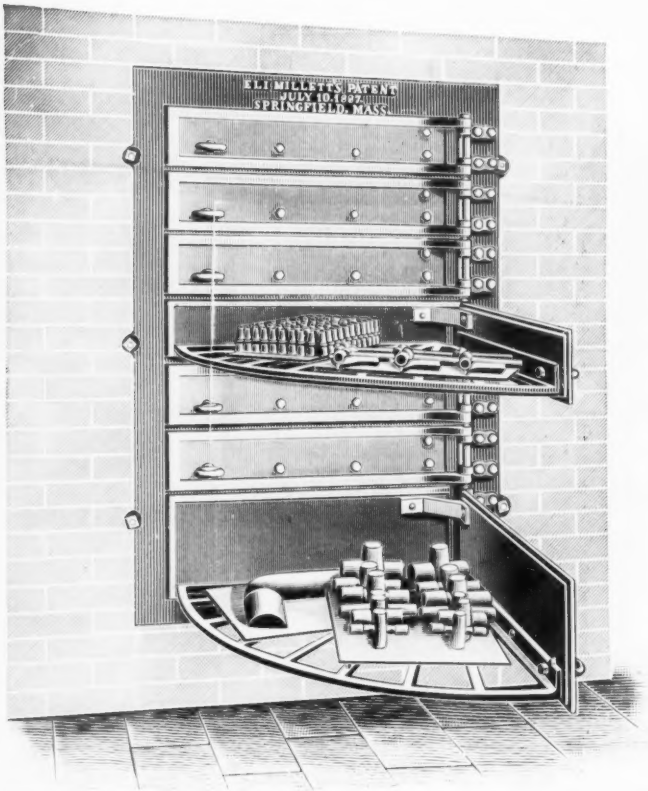


TUMBLING BARREL EXHAUSTER.

Tumbling Barrel Exhausters are easily applied, thoroughly efficient, and change casting cleaning rooms from a death-dealing pestilence to a comfortable working apartment. Send for details.

BUFFALO FORGE CO.,
BUFFALO, N. Y., U. S. A.

CHICAGO, 22-24 W. Randolph St. NEW YORK, 26 Cortlandt St.



Millett's Patent Core Oven

THE BEST IN THE WORLD

No Foundry using small cores can afford to be without it.

Over one hundred and fifty in use.

Send for our new Catalogue giving names of those using them.

Millett Core Oven Co.

BRIGHTWOOD, MASS.

Clinton Iron & Steel Co.

"FAIR DEALING" Their Motto.

MANUFACTURERS OF

"CLINTON" AND "HECTOR"

INSPECTED FOUNDRY IRONS . . . . .

ALSO

Sole Factors for DUNBAR STRONG IRON

In New York and New England.

FURNACES, PITTSBURGH.

NEW YORK OFFICE, No. 15 Cortlandt St.

Why deal with Commission people or Agents who give fancy names to Irons and know nothing about their manufacture.

DEAL WITH THE MANUFACTURER DIRECT.

ESTABLISHED 1854.

Brooklyn Fire Brick Works

CUPOLA BLOCKS, FIRE SAND, FIRE CLAY, FIRE MORTAR, KAOLIN

AND ALL FIRE MATERIAL REQUIRED FOR FOUNDRY PURPOSES.

Send for Illustrated Catalogue and Prices.

88 Van Dyke Street, BROOKLYN, N. Y.

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THE FOUNDRY

The only foundry paper published in the world, and an authority on all matters pertaining to the foundry business.

RATES OF SUBSCRIPTION.

Single subscription to all parts of the United States and Canada, $1 per annum.
" " Universal Postal Union, 1.75 "
Eight or more subscriptions at one time, 75 cents each.

ADVERTISING RATES.

One page - -	per month, $25.00
Half page - - -	" 15.00
Quarter page - -	" 8.50

When space is specified an extra charge of five per cent. on the above figures will be made. All pages between front cover and reading matter reserved for whole page advertisements.

Advertisers in THE FOUNDRY have the privilege of discontinuing their advertisements at any time after they have had three insertions, and will only be charged pro rata for the number of insertions printed. They also have the privilege of changing advertisements as often as desired.

The publishers of THE FOUNDRY appreciate the fact that it is customary for publications, especially the class known as Trade Journals, to quote a rate for advertising from which greater or less discounts are given, according to the persistency of the advertiser. This system is manifestly unfair as tending to show partiality. We have deducted the usual discount before quoting rates thus giving it to all alike, and no reduction of any sort on the above rates can be made.

Copy for advertisements must be in by the 20th of the month preceding publication to insure insertion.

The Coburn Patent Trolley Track

PARLOR DOOR HANGERS.

The adjustment is in the Track and not in the Hanger, as are others.

☞Send for Book.

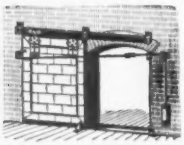
The Coburn Patent Trolley Track

BARN DOOR HANGERS.

Impossible for door to jump the track. Very simple and cheap to apply.

☞Send for Book.

The Coburn Patent Trolley Track



FIRE DOOR HANGERS.

Recommended and adopted by fire underwriters all over the United States.

☞Send for Book.

The Coburn Patent Trolley Track

Overhead Tramway

Furnished complete with straight and curved track, switches, frog brackets, single and double carriers.

☞Send for Book.

The Coburn Patent Trolley Track

—AND—

Patent Rolling Ladder Systems

Over 10,000 in use in the U. S. Roll suspended from ceiling or facing the shelves.

☞Send for Book.

The Coburn Trolley Track Mfg. Co.,

HOLYOKE, MASS.

GLUTROSE

(Trade Mark.)

The Universal Liquid Core Compound

Patented in the United States, England, France and Belgium.

GLUTROSE was invented and is manufactured by a practical foundryman of many years' experience, It has been used in the Pennsylvania Railroad Foundry at Altoona and other large foundries for the past three years with the most satisfactory results.

It is cheaper and better than flour, rosin, oil, molasses or any other compound in use; takes the place of all other materials and never varies in quality.

Makes the most difficult cores for iron or brass of any size.

The cores come out easily and leave the castings smooth.

Will let the air and gases off from a core which is difficult to vent better than any other material in use and makes no offensive smell or smoke.

WILL NEVER BLOW THE CASTINGS.

AMERICAN GLUTROSE WORKS

Sole Manufacturers.

OFFICE: PENN MUTUAL BUILDING,

No. 925 Chestnut St., Philadelphia.

WANTED!

An agreeable associate to join me in purchasing the entire business or controlling interest of a stove manufacturing plant. The writer is in a position to furnish half or three-fourths of capital if necessary. If we buy the entire business we will divide profits, share and share alike. If controlling interest, the intention is to pay small dividends and combine all salaried positions between us, one taking charge of the manufacturing departments, while the other looks after the office work; the writer can fill either position. There is already an established trade in fourteen states, and it is not a question of how many stoves we can sell, but how many we can make. Under existing circumstances, the entire capital stock or controlling interest can be purchased at our own price. No mortgage. Clear title. An unparalleled chance is offered an ambitious and energetic partner with from $2,500 to $10,000, capable and willing to do half the work. References exchanged and a full investigation solicited. Address, "Practical, Box 103, care THE FOUNDRY.

Do You Have Small Imperfections in Castings?

TRY TOMPKIN'S

"Smooth On" Castings Iron Compound.

ITS VALUE IS PROVED BY CONTINUED USE AND INCREASING SALES.

"SMOOTH ON" IRON T COMPOUND CASTINGS

SMOOTH ON MFG. CO. VREELAND TOMPKINS, MANAGER. 551 COMMUNIPAW AVE., JERSEY CITY, N.J.

Estate of Oscar Barnett.

BRUEN, HAMILTON and McWHORTER STREETS
NEWARK, N. J.

Equippers of BRASS FOUNDRIES and Manufacturers of

Not milled with an emery wheel, but accurately planed.

ESTABLISHED 52 YEARS.

Low quotations promptly furnished.

FINISHED HARDWARE SPECIALTIES TO ORDER

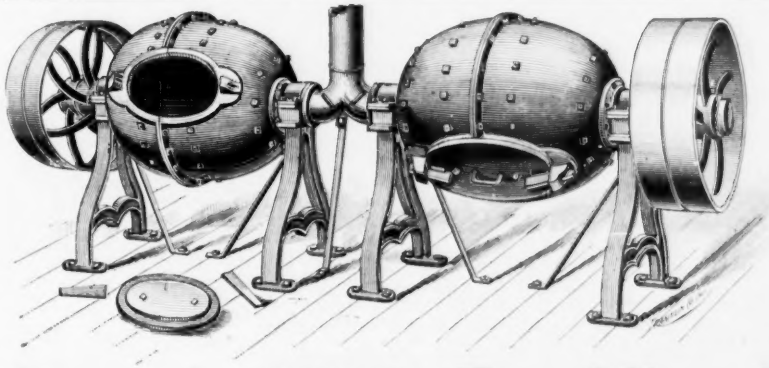
<Standard> OSCAR BARNETT'S Flasks

Beveled . . . . . .

Straight Side . . . . .

—AND—

Improved Light Ribbed



A Fine Pair

Stover's IMPROVED EXHAUST Tumbling Barrels

The Stover Egg Shaped Barrel does doublethe work of any other with less noise and power. It gives the contents a double motion or action—from ends to center and from side to center—causing a thorough mixing and rubbing together of all the parts contained therein, cleaning and polishing the contents better and quicker than any other form of barrel.

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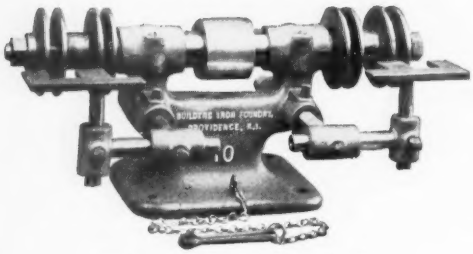

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Every machine—large or small—is set up in our shops and tested at a speed greatly in excess of that to be met in shop practice. We are sure of the successful operation of each and every machine before shipment.

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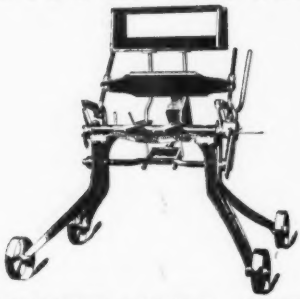

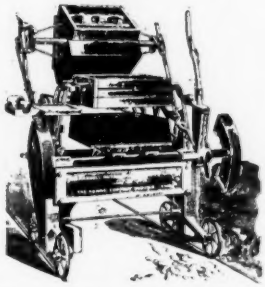

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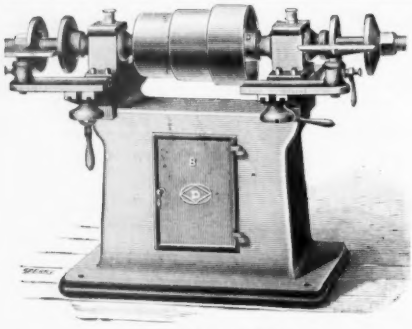

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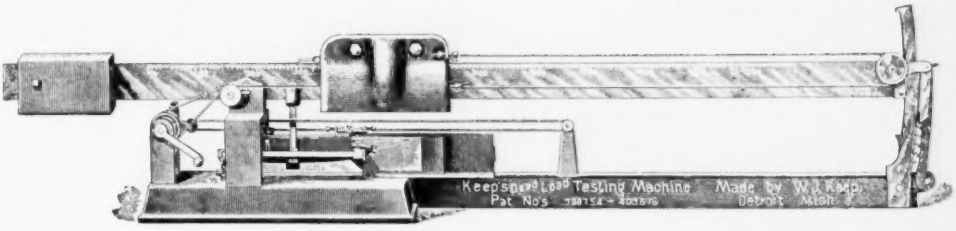

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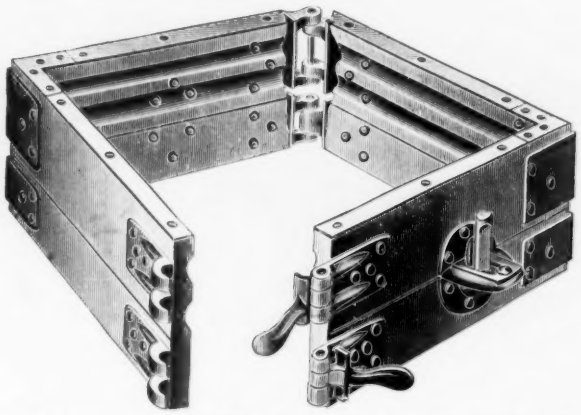

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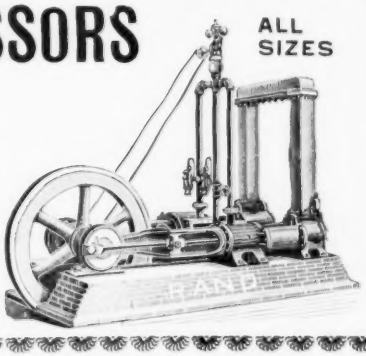

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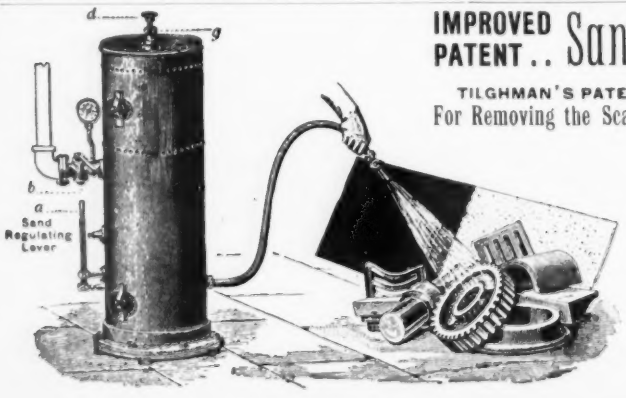

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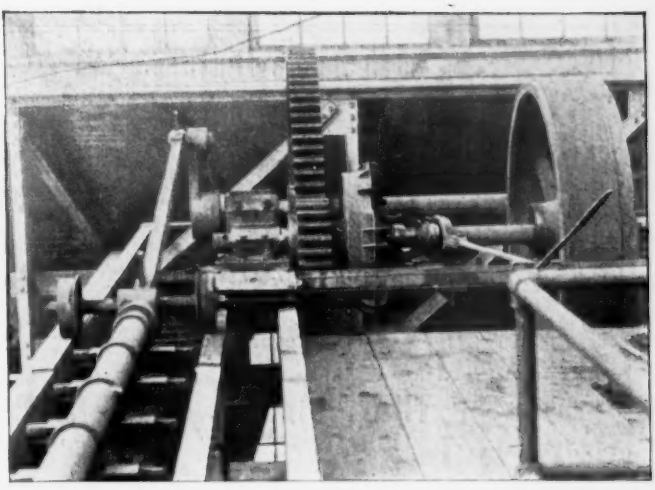

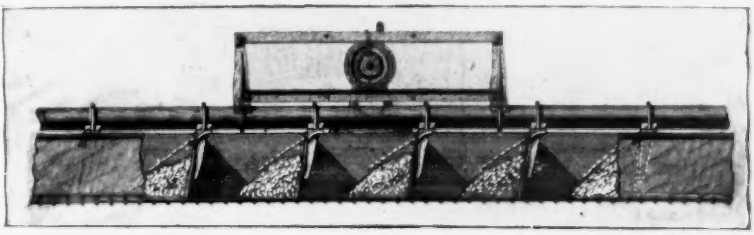

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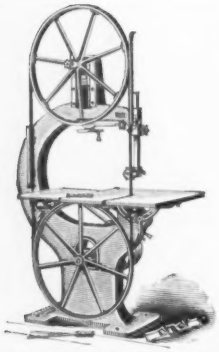

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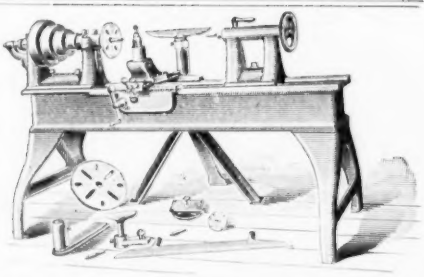

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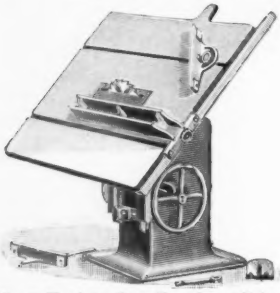

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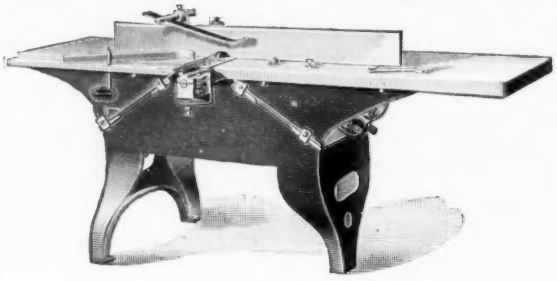

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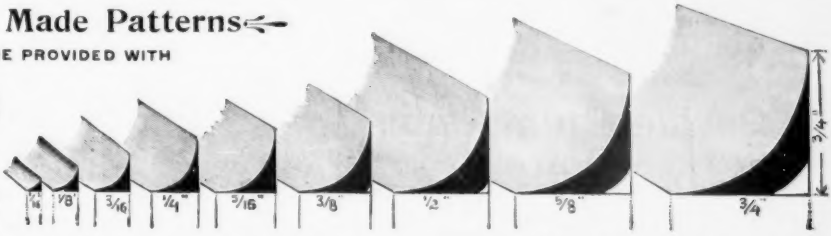

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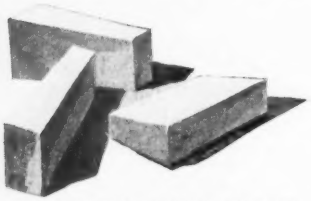

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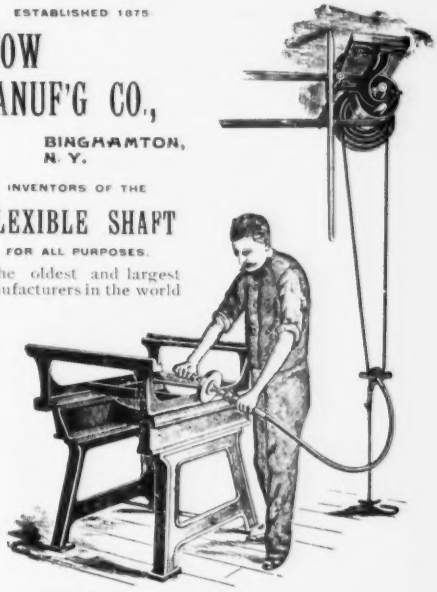

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